CBECC-COM 2013
USER MANUAL

Version 3c
June 26, 2015

About This User Manual

This user manual provides information for using CBECC-Com in one, comprehensive document.

The information presented is current as of the release on the title page. Please refer to the *Quick Start Guide for CBECC-Com 2013* at http://bees.archenergy.com for the latest enhancements and updates to the software.

Document Conventions

Convention	Usage
Emphasis	*For emphasis, Italic type is used.*
Menu commands, commands, options, user input, and tabs	These items found in the user interface are **bolded.**
TIP	This word in a text box indicates an important tip, reminder, or additional information about a particular item, e.g., informational notes or definitions.

Support Information

If you experience any issues with the software, we welcome your feedback to help improve CBECC-Com. Prior to submitting an issue, please verify that you are using the latest release of CBECC-Com. If you are using an older version, refer to the current *Quick Start Guide* and check the release notes to see whether it has been addressed. If you are using the latest release, then please submit an issue in as much detail as possible using the form at http://bees.archenergy.com/issue.html.

Frequently Asked Questions

For a list of frequently asked questions (FAQs), please visit http://bees.archenergy.com/faq.html then select a category to see the complete list of FAQs.

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ABBREVIATIONS AND ACRONYMS

3D	three-dimensional
ACM	Alternative Calculation Method
AFUE	Annual Fuel Utilization Efficiency
AHRI	Air Conditioning, Heating, & Refrigeration Institute
Btu/h	British thermal unit per hour
CEC	California Energy Commission
COP	coefficient of performance
CRAC	computer room air conditioner
CRAH	computer room air handler
CRRC	Cool Roof Rating Council
DDC	direct digital controls
DHW	domestic hot water
DLL	dynamic linked libraries
DOAS	dedicated outdoor air systems
DOE	Department of Energy
DX	direct expansion
EER	energy efficiency ratio
EF	energy factor
EIR	energy input ratio
EPD	equipment power density
GUI	graphical user interface
HVAC	Heating, Ventilating, and Air Conditioning
IPLV	integrated part load value
kTDV	kilowatt time dependent value
LPD	light power density
NACM	Nonresidential Alternative Calculation Methodology
NFRC	National Fenestration Rating Council
OAT	outside air temperature
PAF	power adjustment factors
PDU	power distribution unit
PNNL	Pacific Northwest National Laboratory
PSZ	package single zone
PTAC	package terminal air conditioner
PTHP	package terminal heat pump
PVAV	package variable air volume
R-value	thermal resistance
SDD	Standards Data Dictionary
SEER	seasonal energy efficiency ratio
SHGC	solar heat gain coefficient
SHW	service hot water

SRI	Solar Reflectance Index
SRR	skylight-to-roof ratio
SZVAV	single zone variable air volume
TDV	time dependent value
TSP	total static pressure
UPS	universal power source
VAV	variable air volume
VLT	visible light transmittance
WSHP	water source heat pump
WWR	window-to-wall ratio

OVERVIEW

CBECC-COM 2013 is an open-source software program developed by the California Energy Commission for use in complying with the 2013 update to the *Non-Residential Building Energy Efficiency Standards.* This user manual for CBECC-COM 2013 was written to accompany beta-test versions of the software released starting in June 2013.

This user manual provides detailed descriptions of the software program's major features. It is a good idea to review the *Quick Start Guide for CBECC-Com 2013* before using the program for the first time, or if you have questions while using the program. Additional Help features will be added to future versions of the program.

Calculate the annual energy use for both the Proposed Design and the 2013 Standard Design of "typical" non-residential buildings. The feature set of CBECC-Com 2013 is listed in the section "Software Capabilities."

Energy Commission Approval

STATE OF CALIFORNIA

Energy Resources Conservation
And Development Commission

2013 Building Energy Efficiency Standards,
California Code of Regulations, Title 24,
Parts 1 and 6

Docket No. 12-BSTD-01
Resolution No. 15-0619

APPROVAL BY THE EXECUTIVE DIRECTOR OF THE PUBLIC DOMAIN
NONRESIDENTIAL COMPLIANCE SOFTWARE CBECC-COM VERSION 3C
FOR COMPLYING WITH THE 2013 BUILDING ENERGY EFFICIENCY STANDARDS

The Executive Director hereby approves CBECC-Com Version 3c as the public domain alternative calculation method for demonstrating performance compliance with the nonresidential provisions of the 2013 Building Energy Efficiency Standards, California Code of Regulations, Title 24, Part 6, and associated administrative regulations in Part 1, Chapter 10 (Standards).

The Warren-Alquist State Energy Resources Conservation and Development Act, Public Resources Code sections 25000 et seq., 25402.1, subd. (b), requires the Energy Commission to, among other things, establish a process for certifying calculation methods for demonstrating compliance with its building energy efficiency standards.

CBECC-Com Version 3c incorporates corrections to the compliance manager that was previously approved by the Energy Commission on March 24, 2015, as part of the Application Programming Interface (API) in the 2013 Public Domain California Building Energy Code Compliance - Nonresidential (CBECC-Com) Software Version 3b.

Corrections in Version 3c include:

- Updating the minimum equipment efficiencies used to calculate the standard budget for single phase air conditioners and heat pumps with output less than 65,000 Btu/h to match the 2014 Appliance Efficiency Standards.
- Creating new HVAC systems for naturally ventilated spaces to allow the fan to be cycled based on space temperature to match the standard system.
- Corrections to the water heating calculations in high rise residential designs that will allow for an individual water heating system per each dwelling unit.
- Removing the mandatory U-Factor check for existing assemblies.
- Updating the PRF-01 report signature block to improve usability.
- Corrections to various minor errors.

In approving CBECC-Com Version 3b on March 24, 2015, the Energy Commission directed the Executive Director to take all actions reasonably necessary to ensure that CBECC-Com is maintained and revised to accurately estimate the energy use of nonresidential buildings and demonstrate compliance with the 2013 Building Energy Efficiency Standards, including correcting functional errors.

In addition to increasing functionality and solving concerns from the building industry, addressing these issues does not significantly affect compliance with the 2013 Building Energy Efficiency Standards[1]. Thus, this update is not required to be approved by the Energy Commission[2].

Information for obtaining CBECC-Com Version 3c will be posted on the Energy Commission's 2013 Standards website for approved computer compliance programs: http://www.energy.ca.gov/title24/2013standards/2013_computer_prog_list.html.

ROBERT P. OGLESBY
Executive Director

[1] Cal. Code Regs., Title 24, Pt. 1, Ch. 10, and Pi. 6 (also known as the California Energy Code).
[2] See Nonresidential Alternative Calculation Method Approval Manual, May 2012, Pub. No. CEC-400-2012-006-CMF-REV, § 1.2.2. p. 1 - 4, available at http:/Jwww.energy.ca.gov/2012publications/CEC-400-2012-006/CEC-400-2012-006-CMF-REV .pdf.

Software Capabilities

The CBECC-Com's scope, features, and capabilities are listed below. For an updated list of capabilities included in Version 3b, please refer to the Quick Start Guide included with the software.

Scope

1. Newly constructed buildings
2. CBECC-Com will produce results of the performance tests described in the *2013 Title 24 Nonresidential ACM Reference Manual*.
3. The 2013 Standards ruleset and rules processing software have the capability to be included in third party compliance software using Dynamic Linked Libraries (DLLs) and includes ruleset encryption to "lock" the 2013 Standards ruleset.

Site/Building

1. Include identifying information.
2. Include other general information required for compliance forms.
3. Include location information.
4. Identify climate zone and weather/design day files from the project site ZIP code.

Envelope

1. Provide a comprehensive list of accurately described opaque materials.
2. Combine materials into constructions.
3. Describe fenestration performance properties via the simplified approach (e.g., U-value, Solar Heat Gain Coefficient (SHGC), Visible Transmittance).
4. Apply exterior insulated constructions to demising surfaces.
5. Check that proposed exterior constructions meet mandatory U-value requirements.
6. Remove user model building shades.
7. Retain user model geometry.
8. Adjust excess user model fenestration to standard design maximum window-to-wall ratio (WWR) and skylight-to-roof ratio (SRR) values.

Lighting and Other Internal Loads

1. Replace user lighting systems with simple Light Power Density (LPD) values based on space function.
2. Allow simple lighting inputs for LPD and lighting schedules without the need to specify details of an interior lighting system.
3. Allow detailed lighting inputs for credits and allowances:
    a. Lighting Controls and associated power adjustment factors (PAFs)
    b. Area Category Lighting Allowances
    c. Tailored Lighting Allowances
4. Replace user occupancy and equipment loads with Alternative Calculation Method (ACM)-specified values.
5. Replace user-specified infiltration rates with ACM values.
6. Replace user-specified schedules with ACM schedules.
7. Combine space-level data into zones.

Heating, Ventilating, and Air Conditioning (HVAC)

1. Replace user-specified HVAC system with baseline system.
    a. Baseline sizing run is autosized.
    b. Baseline run hard sized using baseline sizing results
2. Model user-specified HVAC systems with user-supplied sizing:
    a. Package single zone (PSZ)
    b. Single zone variable air volume (SZVAV)
    c. Package variable air volume (PVAV)
    d. Variable air volume (VAV)
    e. Package terminal air conditioner (PTAC)
    f. Package terminal heat pump (PTHP)
    g. Water source heat pump (WSHP)
    h. Four pipe fan-coil units (FPFC)
    i. Baseboard heating
    j. Evaporative Cooling
    k. Exhaust Fans
    l. Dedicated outdoor air systems
    m. Plenum supply and return
    n. Series fan-powered VAV boxes
    o. CRAC and CRAH systems for computer rooms
    p. Special requirements enabled for process spaces (computer rooms, kitchens, laboratories)
    q. Heating coils
        i. Gas furnace
        ii. Hot water
        iii. Electric
        iv. Direct expansion (DX) (heat pump)
    r. Cooling coils
        i. Chilled water
        ii. DX
    s. Boilers
        i. Hot water
        ii. Gas
        iii. Oil
        iv. Electric
        v. Natural draft
        vi. Mechanical draft
    t. Chillers
        i. Screw
        ii. Reciprocating
        iii. Centrifugal
        iv. Air-cooled
        v. Water-cooled
    u. Chilled water loop pumping
        i. Primary only
        ii. Primary-secondary
    v. Economizers

i. Non-integrated
ii. Integrated

w. Economizer Controls
i. Fixed temperature
ii. Differential temperature
iii. Fixed enthalpy
iv. Differential enthalpy

Domestic Water Heating

1. Storage water heaters
   a. Gas
   b. Electric
   c. Oil
2. Recirculating domestic hot water (DHW) systems for residential occupancies

Output

1. Report simulation errors and warnings including useful descriptions.
2. Report number of hours with setpoint not met by thermal zone.
3. Report energy consumption by fuel and end-use.
4. Report time dependent value (TDV) energy by end use.
5. Report TDV energy comparison of Proposed and Standard Design, including Compliance Margin.
6. Generate "Perf-1" summary compliance form.

Interface

1. Ability to access and modify parameters needed to simulate the above
2. Option to perform simulations in two modes:
   a. Proposed Only (applies rules and simulates the Proposed Design)
   b. Proposed and Standard (applies rules and simulates the Proposed and Standard Designs)
3. *CBECC-Com Quick Start Guide* available from the **Help** tab
4. CBECC-Com software license available from the **Help** tab

Documentation

1. *2013 Title 24 Nonresidential ACM Reference Manual*
2. EnergyPlus technical documentation
3. Meeting criteria in *2013 Nonresidential ACM Approval Manual* (e.g., *CBECC-Com User Manual*)
4. Issues Log available with each CBECC-Com version release—to document bugs identified and fixed

STANDARD INPUT AND OUTPUT REPORTS

A variety of input and output reports are available to review the compliance analysis. These reports are described below.

Basic Output Results

At the completion of the analysis, the Basic Output Results screen shows the energy use summary for the building and each end-use in terms of Site energy (by fuel type) and Source Energy in kTDV. This output screen also reports a summary of unmet load hours, a compliance margin for each end-use and the whole building, and an indication of whether the building passes or fails the compliance analysis. See Figure 1 for an example of the Basic Output Results screen.

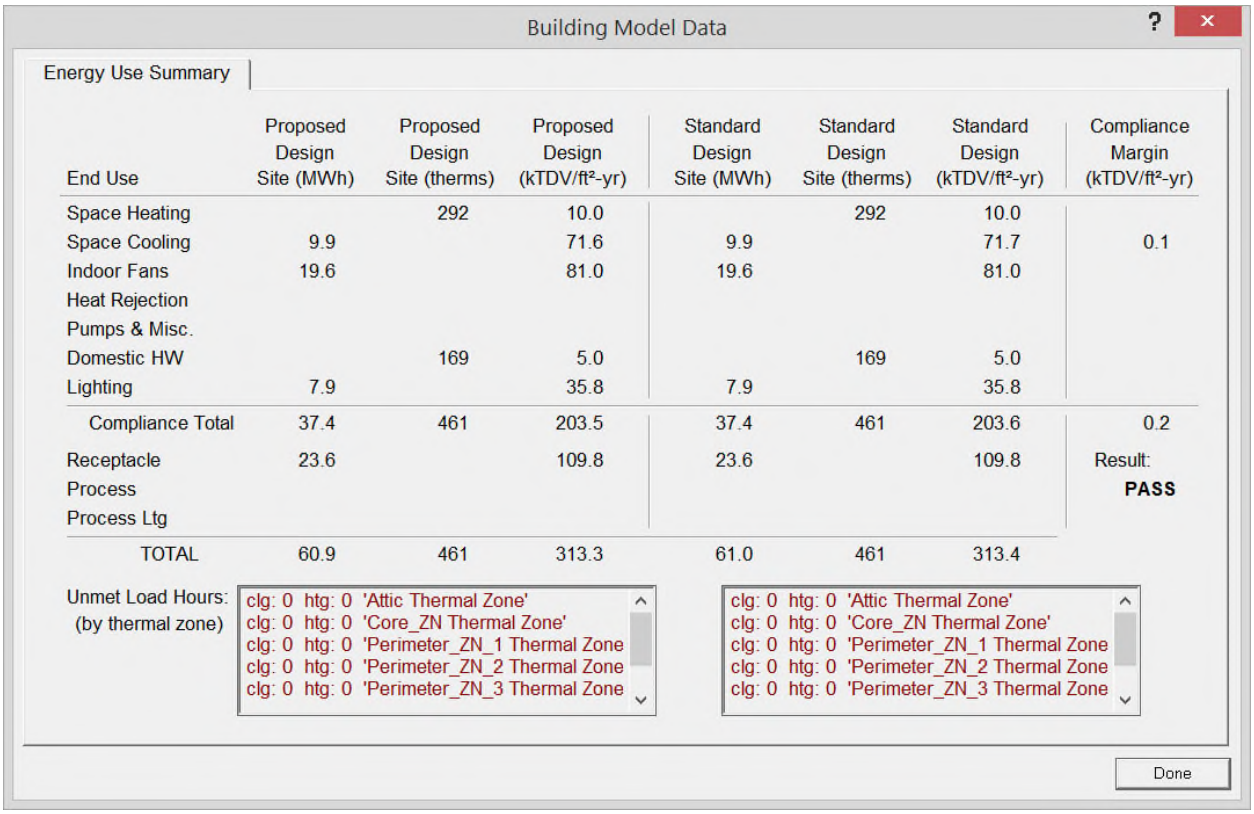
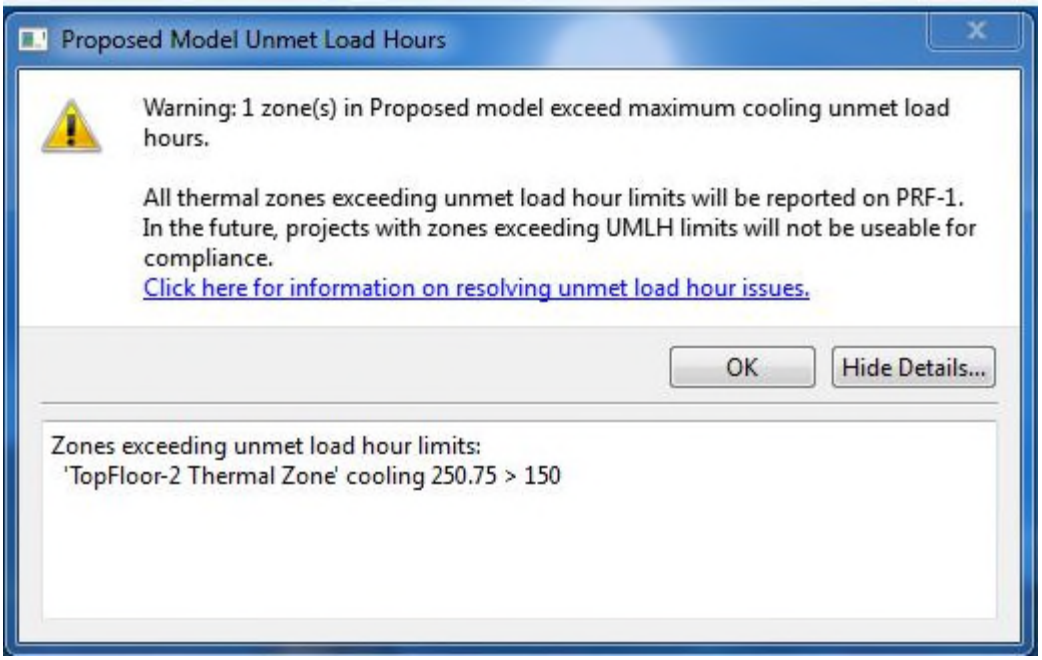

Building Model Data
Energy Use Summary
End Use
Proposed Design Site (MWh)
Proposed Design Site (therms)
Proposed Design (kTDV/ft²-yr)
Standard Design Site (MWh)
Standard Design Site (therms)
Standard Design (kTDV/ft²-yr)
Compliance Margin (kTDV/ft²-yr)
Space Heating 292 10.0 292 10.0
Space Cooling 9.9 71.6 9.9 71.7 0.1
Indoor Fans 19.6 81.0 19.6 81.0
Heat Rejection
Pumps & Misc.
Domestic HW 169 5.0 169 5.0
Lighting 7.9 35.8 7.9 35.8
Compliance Total 37.4 461 203.5 37.4 461 203.6 0.2
Receptacle 23.6 109.8 23.6 109.8
Process
Process Ltg
Result: PASS
TOTAL 60.9 461 313.3 61.0 461 313.4
Unmet Load Hours: (by thermal zone)
clg: 0 htg: 0 'Attic Thermal Zone'
clg: 0 htg: 0 'Core_ZN Thermal Zone'
clg: 0 htg: 0 'Perimeter_ZN_1 Thermal Zone
clg: 0 htg: 0 'Perimeter_ZN_2 Thermal Zone
clg: 0 htg: 0 'Perimeter_ZN_3 Thermal Zone
clg: 0 htg: 0 'Attic Thermal Zone'
clg: 0 htg: 0 'Core_ZN Thermal Zone'
clg: 0 htg: 0 'Perimeter_ZN_1 Thermal Zone
clg: 0 htg: 0 'Perimeter_ZN_2 Thermal Zone
clg: 0 htg: 0 'Perimeter_ZN_3 Thermal Zone
Done

Figure 1 – Basic Output Results

Unmet Load Hours

A warning message will pop up at the end of the simulation if any thermal zone in the building has more than 150 cooling or heating unmet load hours. In CBECC-Com v3c, thermal zones in the proposed model exceeding unmet load hour limits will not terminate compliance analysis but will generate a warning, and will be included in a new table on the compliance report.


Proposed Model Unmet Load Hours
Warning: 1 zone(s) in Proposed model exceed maximum cooling unmet load hours.
All thermal zones exceeding unmet load hour limits will be reported on PRF-1.
In the future, projects with zones exceeding UMLH limits will not be useable for compliance.
Click here for information on resolving unmet load hour issues.
OK
Hide Details...
Zones exceeding unmet load hour limits:
'TopFloor-2 Thermal Zone' cooling 250.75 > 150

Certificate of Compliance Report

CBECC-Com 2013 produces the Certificate of Compliance for the Nonresidential Performance Compliance Method, NRCC-PRF-01-E. Refer to the ***Sample Compliance Documentation*** section for a detailed description of the report.

Analysis Results XML File

Additionally, a full summary of all building inputs and outputs used in the compliance analysis are generated during the analysis. This data is captured in an XML file called:

<project file name> - Analysis Results.XML

The AnalysisResults XML file is saved in the same folder location as the project CIBD file.

The AnalysisResults XML file contains data for each model used in the analysis:

- The Original User Model
- The Proposed Design Model
- The Standard Design Model

Figure 2 shows the organization of the XML file containing details for each of the three analysis models.

Figure 2 – AnalysisResults.XML: Three Analysis Models

Figure 3 shows an example of the analysis output results for the Proposed Model. The EUseSummary tag contains annual Time Dependent Valuation (TDV) energy results for each end use (which are reported in the Basic Output Results screen shown in Figure 1). The EnergyUse tag shows detailed energy consumption summary for each building end-use. The data includes total TDV energy consumption, total site energy consumption, and a breakdown of TDV and site energy by each fuel type for that end use.

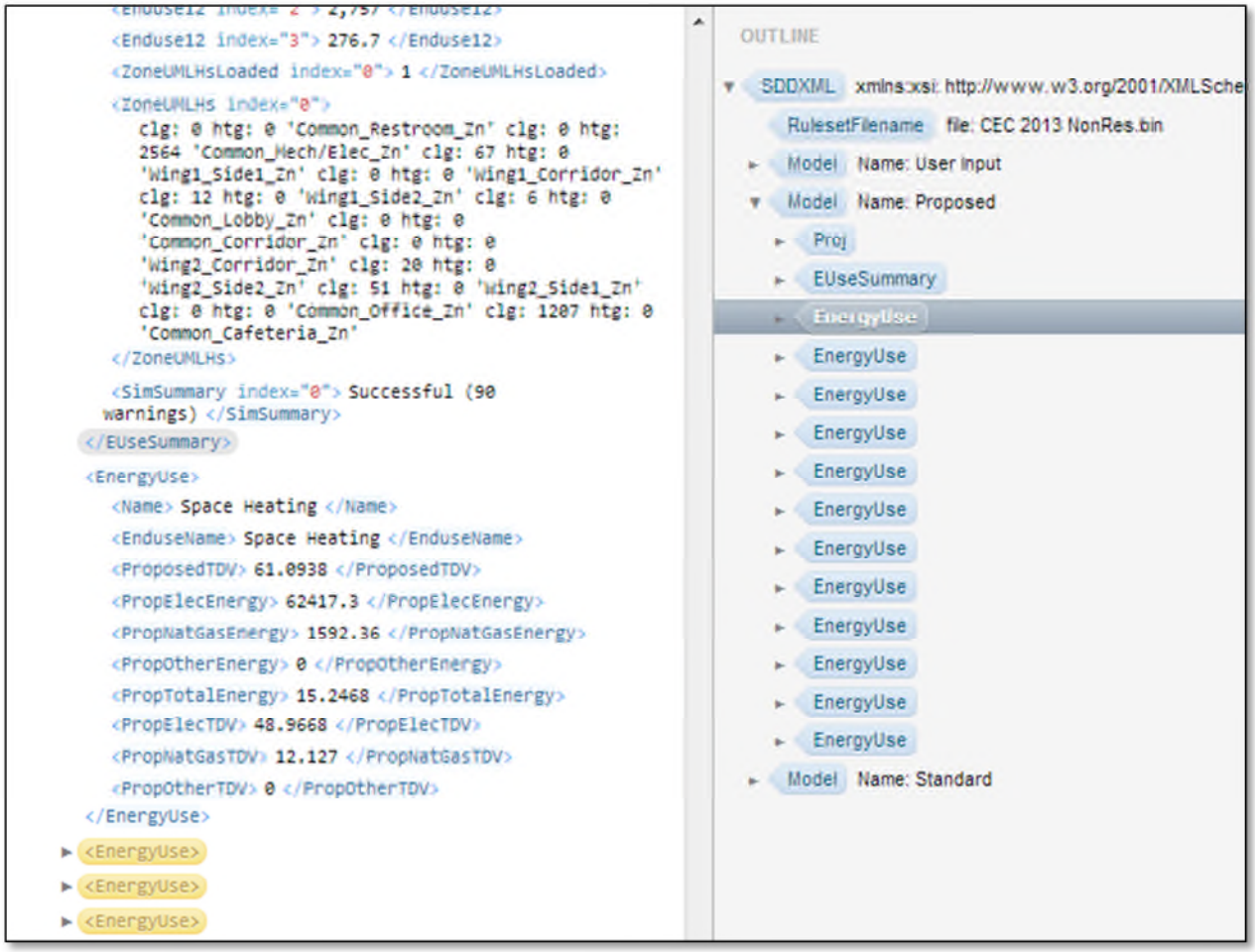


Figure 3 – Analysis Output Results for each End Use

Additionally, full reports of all building inputs for each analysis model are echoed in the AnalysisResults XML file. The organization of the input data follows the Standards Data Dictionary (SDD) data model structure. Figure 4 illustrates the XML format of the Building data.

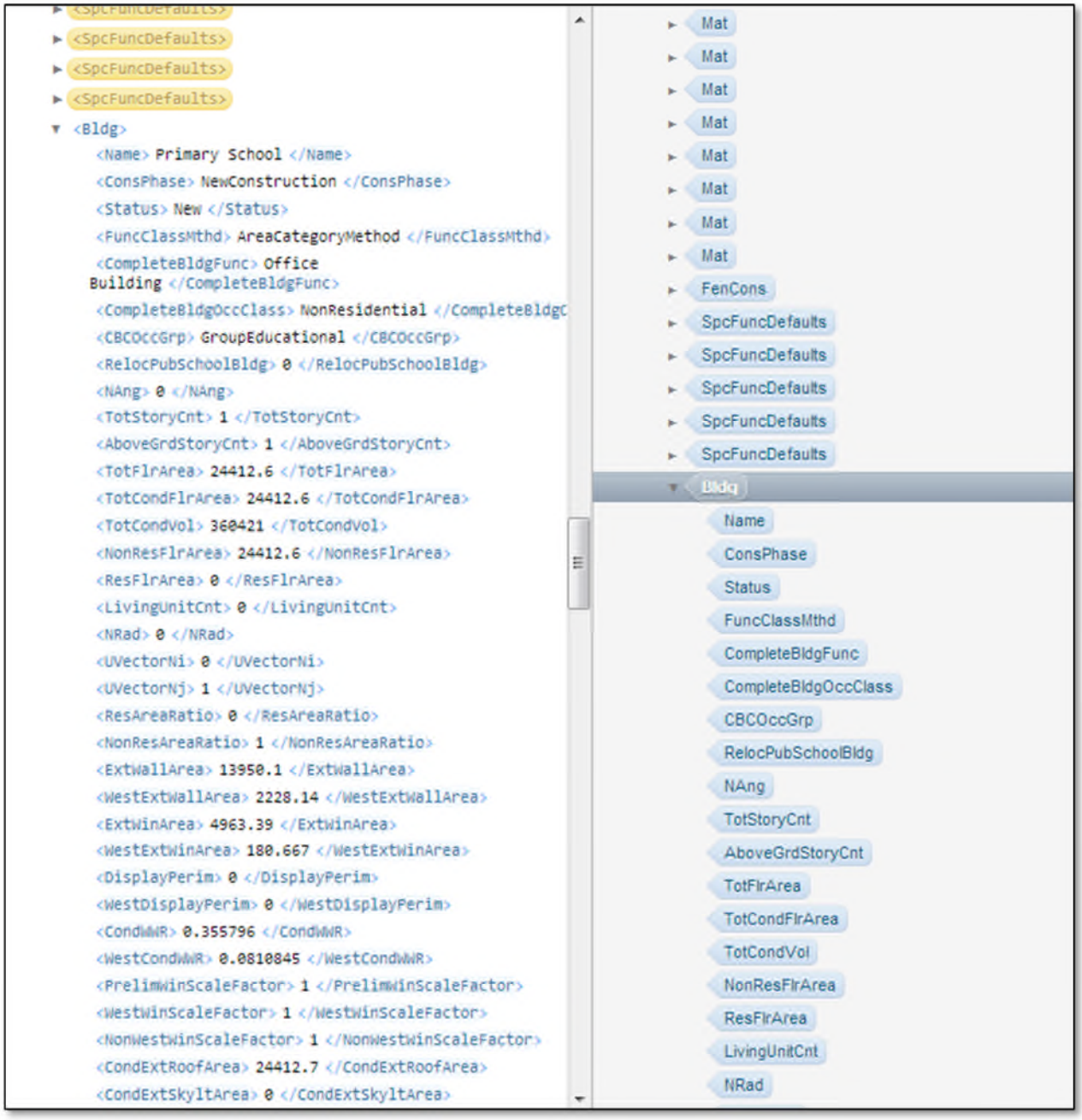


Figure 4 – Echo of All Building Inputs in the AnalysisResults XML File

Log File

A log file is associated with every CBECC project. It is located in the same folder as the project .cibd file and is named: <project name>.log. The log file contains a history of when the project was opened and saved, when an analysis was performed, and any errors or warnings that occurred during an analysis.

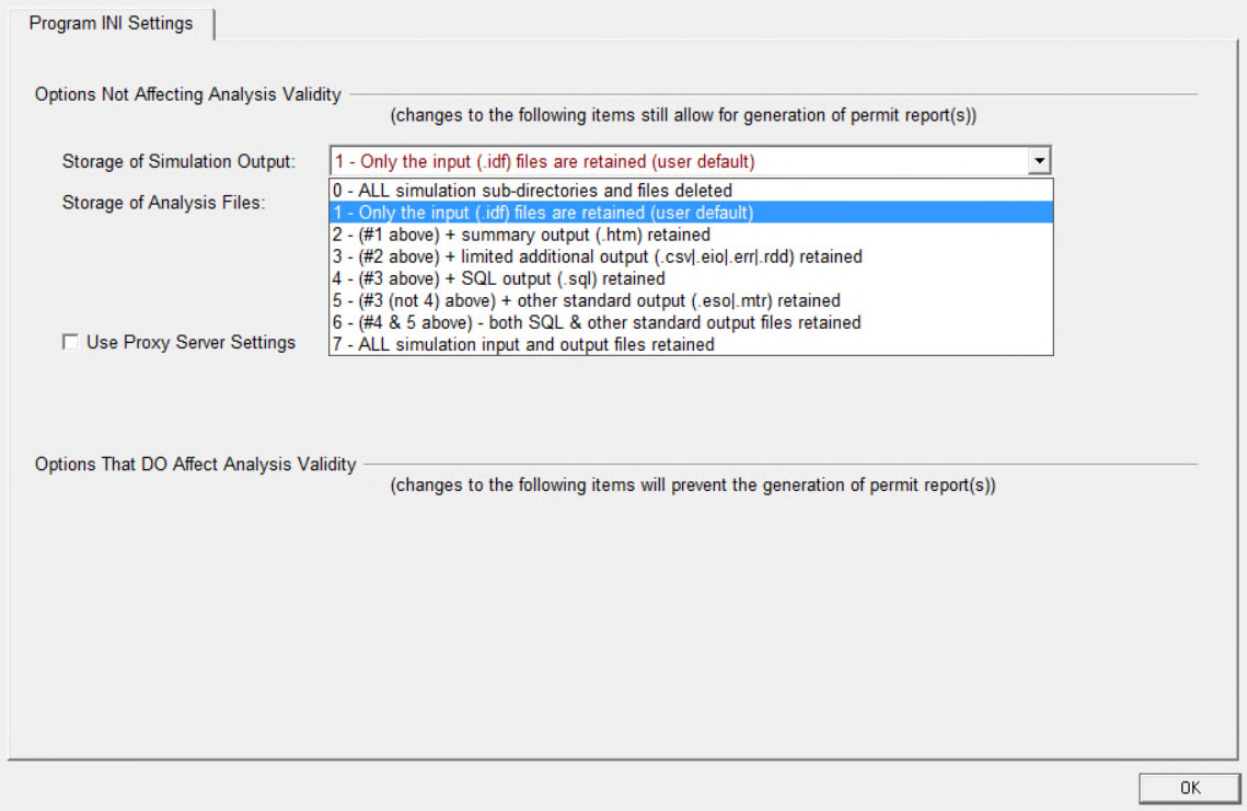
To view or edit a log file, in the main menu go to the **Tools** menu and click **View Project Log File**.

EnergyPlus Output Files

A set of EnergyPlus output files is generated during each simulation performed. Depending on the settings in your .ini file, these files may or may not be retained. For details on the EnergyPlus output files, please refer to the EnergyPlus documentation that can be found here: http://apps1.eere.energy.gov/buildings/energyplus/energyplus_documentation.cfm

From the CBECC-Com main menu, selecting **Tools** then **Program and Analysis Options** displays the **CBECC Program INI Settings** screen shown below. The **Storage of Simulation Output** drop-down box controls the retention of EnergyPlus output files.

Note: Making a change to these options requires closing CBECC-Com and reopening it before the changes take effect.


Program INI Settings
Options Not Affecting Analysis Validity
(changes to the following items still allow for generation of permit report(s))
Storage of Simulation Output:
1 - Only the input (.idf) files are retained (user default)
Storage of Analysis Files:
0 - ALL simulation sub-directories and files deleted
1 - Only the input (.idf) files are retained (user default)
2 - (#1 above) + summary output (.htm) retained
3 - (#2 above) + limited additional output (.csv|.eio|.err|.rdd) retained
4 - (#3 above) + SQL output (.sql) retained
5 - (#3 (not 4) above) + other standard output (.eso|.mtr) retained
6 - (#4 & 5 above) - both SQL & other standard output files retained
7 - ALL simulation input and output files retained
Use Proxy Server Settings
Options That DO Affect Analysis Validity
(changes to the following items will prevent the generation of permit report(s))
OK

Error Reporting

CBECC-Com provides error messages if the compliance analysis fails. Each error message has a numerical code listed below.

1. pszBEMBasePathFile doesn't exist
2. pszRulesetPathFile doesn't
3. pszSimWeatherPath doesn't
4. pszDHWDLLPath specified, but doesn't
5. Invalid project log file name (too long)
6. Error writing to project log
7. Building model input/project file not found
8. Error reading/initializing model input/project file
9. Errors encountered evaluating input model defaulting rules
10. Errors encountered evaluating input model defaulting rules (multiple times)
11. Error(s) encountered performing required data & numeric range checks
12. Error(s) encountered checking input model for simulation compatibility
13. Error(s) encountered checking input model for code requirements
14. Error encountered initializing weather file locations and/or names
15. Error creating or accessing the analysis processing directory
16. Error generating Proposed Sizing model
17. Error generating Proposed (final) model
18. Error generating Standard Sizing model
19. Error generating Standard (final) model
20. Error initializing Standard Sizing model
21. Error initializing Standard (final) model
22. Analysis aborted - user chose not to overwrite SDD XML file
23. Error: Unable to write SDD XML file
24. Error(s) encountered simulating Proposed model
25. Error(s) encountered simulating Standard Sizing model
26. Error(s) encountered simulating Standard (final) model
27. Error(s) encountered retrieving Proposed model simulation results
28. Error(s) encountered retrieving Standard Sizing model simulation results
29. Error(s) encountered retrieving Standard (final) model simulation results
30. Proposed model zone(s) exceed unmet load hours limits
31. Error initializing building model database
32. Error loading analysis ruleset
33. User aborted analysis via progress dialog 'Cancel' button
34. Invalid results object types
35. Error copying results objects from a previous model
36. Error copying equipment sizes/flows from source model
37. Error(s) encountered reading building model (input/project) file
38. Error: EnergyPlus simulation engine not found.

39. Error: Version of EnergyPlus installed not compatible with analysis.
40. Error setting up check of weather & design day file hashes
41. DHW simulation not successful

(Return values in the range 101–200 describe issues encountered during/by simulation.)

101 : SDD XML simulation input file not found
102 : Simulation weather file not found
103 : Simulation processing path not valid
104 : Simulation executable path not valid
105 : Simulation error output path/file not valid
106 : User aborted analysis
131 : Error encountered in OpenStudio loading SDD XML file
132 : Error encountered in OpenStudio saving model to OSM file
133 : Unable to locate EnergyPlus simulation SQL output file
134 : OpenStudio Model not valid following simulation
135 : OpenStudio Facility not valid following simulation
136 : Error creating OpenStudio Model object
161 : Fatal error(s) occurred in EnergyPlus simulation
162 : EnergyPlus simulation did not complete successfully
181 : User aborted analysis during building model simulation

FIXED AND RESTRICTED INPUTS

CBECC-Com utilizes fixed and restricted inputs for both the Standard Design, and elements of the Proposed Design as specified in the *2013 Nonresidential Alternative Calculation Method* (NACM) *Reference Manual*. A detailed summary of all fixed and restricted inputs can be found in the 2013 NACM:

http://www.energy.ca.gov/2013publications/CEC-400-2013-004/CEC-400-2013-004-SD.pdf

Classification of Input Types in CBECC-Com

The user interface provides feedback on different types of inputs by displaying text in a variety of colors. The following summarizes the meaning of each text color.

Type of Input	Text Color	Meaning
Undefined	Black	Data currently has no value in the building description. The only time anything that is "undefined" is written or displayed in the user interface (UI) is when an enumeration list selection (select from a drop-down list or enter information) includes a "- none -" entry, which is displayed in this color.
Program Default	Dark Cyan	When an enumeration list is defined in the Enums.txt file (along with a valid default setting) and no DEFAULT rule expression is present in the ruleset, then the default selection displays in the GUI using this color.
Rule Defined	Dark Blue	All fields that are set via DEFAULT or other ruleset expressions
User Defined	Dark Red	Any field that was input or specified by the user. These data are all written to project (CIBD/XML) files to persist across each CBECC session. Some data that is set by the program is also characterized as User Defined whenever it is something that is important to be available in future CBECC sessions of that project.
Simulation Results	Dark Green	When simulation results are pulled directly out of sim output files and posted to the building model, then they are typically flagged as SimResults. Most of the results shown in CBECC are processed by the ruleset and therefore display as Rule Defined, but some data including zone UMLH results are displayed in green immediately following the analysis.

PREPARING BASIC INPUT

In order to start a new project, the user must first prepare basic input into a model that describes his/her building project. This model is called the ***User Model***. During the analysis calculation procedure, this model is used to automatically define the two compliance models:

1. The ***Proposed Design Model***—the Proposed Design model is very similar to the User Model; however, some inputs such as schedules, plug-loads, and others are replaced with prescribed values specified in the NACM.
2. The ***Standard (Baseline) Design Model***—the Standard Design model is generated according the Standard Design rules in the NACM. Users can think of this model as a hypothetical version of their building if it was designed to just meet the mandatory and prescriptive requirements of the Title 24 (Part 6) standards.

The workflow for preparing the User Model and performing compliance analysis is broken into several steps. While the majority of the data input and the analysis procedures take place directly in the CBECC-Com user interface, additional free software tools (identified below) are used for some elements of the analysis. The data is captured in a data model called the Standards Data Dictionary (SDD). SDD models are represented by an XML file format that can be read and written by CBECC-Com. CBECC-Com converts this file to a .CIBD file extension (the software's native file extension).

- Building geometry and zone assignments can be generated within the CBECC-Com interface or by using the **OpenStudio plug-in for Trimble SketchUp (v 8.0)**.

Building Geometry—Detailed vs. Simplified

Building geometry generated using the OpenStudio plug-in is referred to as the *Detailed Geometry* approach and geometry generated using the CBECC-Com interface is referred to as *Simplified Geometry* approach. Using the OpenStudio plug-in, the user can export geometry to SDD XML file format for input into the CBECC-Com user interface.

The key difference between the two approaches is that the *Detailed Geometry* approach requires the user to draw the building and all its elements using a drawing tool, in this case SketchUp with the OpenStudio plug-in. This approach accurately represents a building and its elements in three-dimensional (3D) form. Spatial relationships and properties of the building surfaces such as areas, orientation and tilt are accurately represented in the 3D drawings. The *Simplified Geometry* approach on the other hand defines the properties (areas, orientation, tilt, etc.) of the building surfaces within the CBECC-Com interface, but the spatial relationship between surfaces is not defined. A description of the *Simplified Geometry* approach can be found in the Starting a New Project section.

The workflow for non-residential compliance analysis includes the following steps:

- After the building geometry has been created the remainder of the User Model building inputs is entered in the CBECC-Com user interface.
- The compliance analysis is launched within the CBECC-Com user interface. When the analysis is launched, CBECC-Com automatically generates the Proposed Design model and the Standard Design (also referred to as the Baseline) model in SDD XML format.
- The SDD XML files are translated by the **OpenStudio Translator** to EnergyPlus IDF files. This process is automated by CBECC-Com and requires no intervention by the users.

- The IDF files are simulated by the **EnergyPlus v8.1** engine. Three or four simulations occur, depending on the Compliance Type:
    - The Proposed sizing simulation is included determines HVAC system capacities for the Proposed Design model when the compliance type is one where the proposed design HVAC system is defined by the ACM rules.
    - The Standard Design sizing simulation determines HVAC system sizes for the Standard Design model.
    - The Proposed Design annual simulation calculates annual energy and TDV energy consumption for the Proposed Design model.
    - The Standard Design annual simulation calculates annual energy and TDV energy consumption for the baseline Standard Design model.

    Note: the simulation processes are automated by CBECC-Com and require no intervention by the user. A progress indicator provides feedback to users on the status of the simulations.
- Results from the EnergyPlus simulations are automatically retrieved by CBECC-Com and presented in a results summary screen.

This workflow is illustrated in Figure 5. Additional details for each step in the workflow are provided in the following sections.

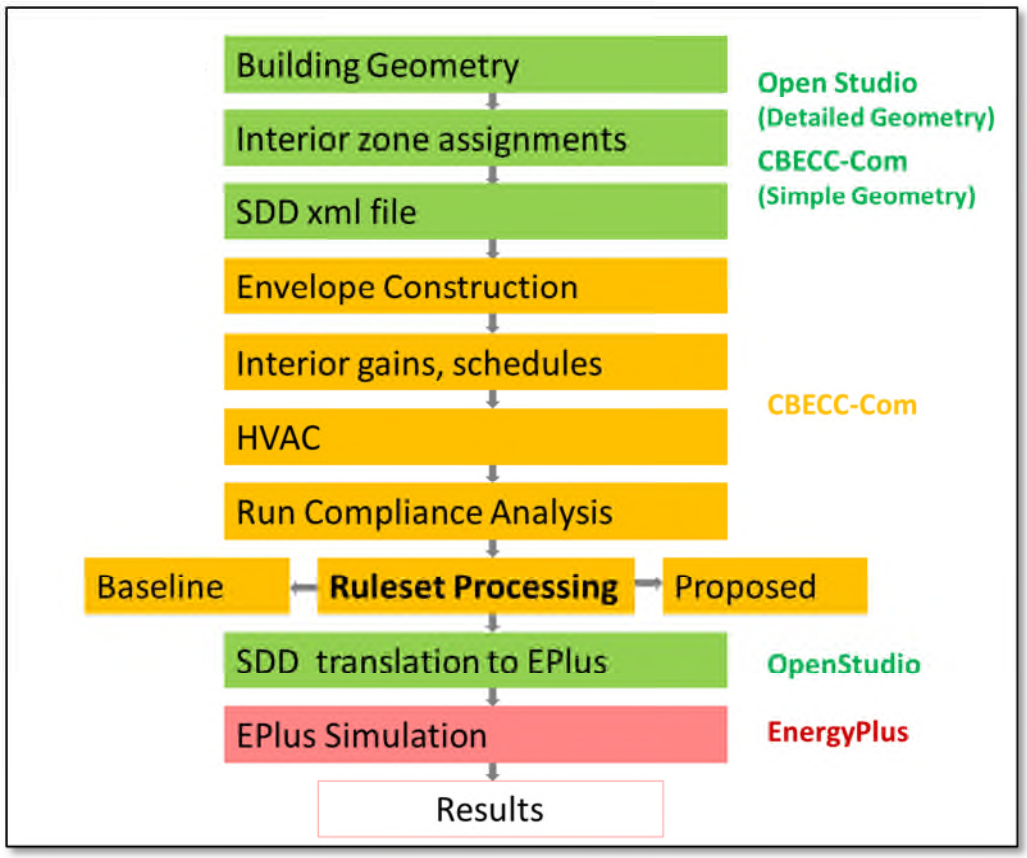


Figure 5 – Workflow for Non-Residential Compliance Analysis

Where to Get Additional Software Tools

Additional software tools can be found either within CBECC-Com or at the following websites.

Trimble SketchUp: http://www.sketchup.com/ (Note that versions of Sketchup, such as Sketchup Pro, may not be free, or may have restrictive user licences, such as with Sketchup Make.) If you would like to use SketchUp 8.0 (free version) please contact CBECC-Com Support at CBECC.Com@gmail.com.

OpenStudio SketchUp Plug-In: https://www.openstudio.net/ (Note: Please download the compatible version of OpenStudio for the version of SketchUp that you are using)

OpenStudio Translator: No additional download is required. This functionality is included in the CBECC-Com installation.

EnergyPlus: CBECC-Com v3c uses EnergyPlus v8.1; however, you no longer need to install EnergyPlus v8.1 separately. EnergyPlus executables are now included in the CBECC-Com v3c installer.

Creating Building Geometry Using the OpenStudio Plug-In for Trimble SketchUp

The OpenStudio plug-in for SketchUp allows users to create a representation of a building's geometry. The tool should be used for the following steps:

- Draw the building's floor plans, and generate all *Building Stories* and *Spaces* in the building.
- Draw all *Surfaces* (e.g., walls, floors, roofs) and sub-surfaces (e.g., windows, doors, skylights) and verify that they are accurately assigned as exterior or interior surfaces.
- Assign all *Spaces* to *Thermal Zones.*
- Additionally, you may wish to give the spaces and zones meaningful names (e.g., as they appear on the building floor plans).

Detailed tutorials for creating building geometry can be found at the following link:

http://openstudio.nrel.gov/sketchup-plug-tutorials

Figure 6 shows an example of a two story building created with the OpenStudio plug-in.

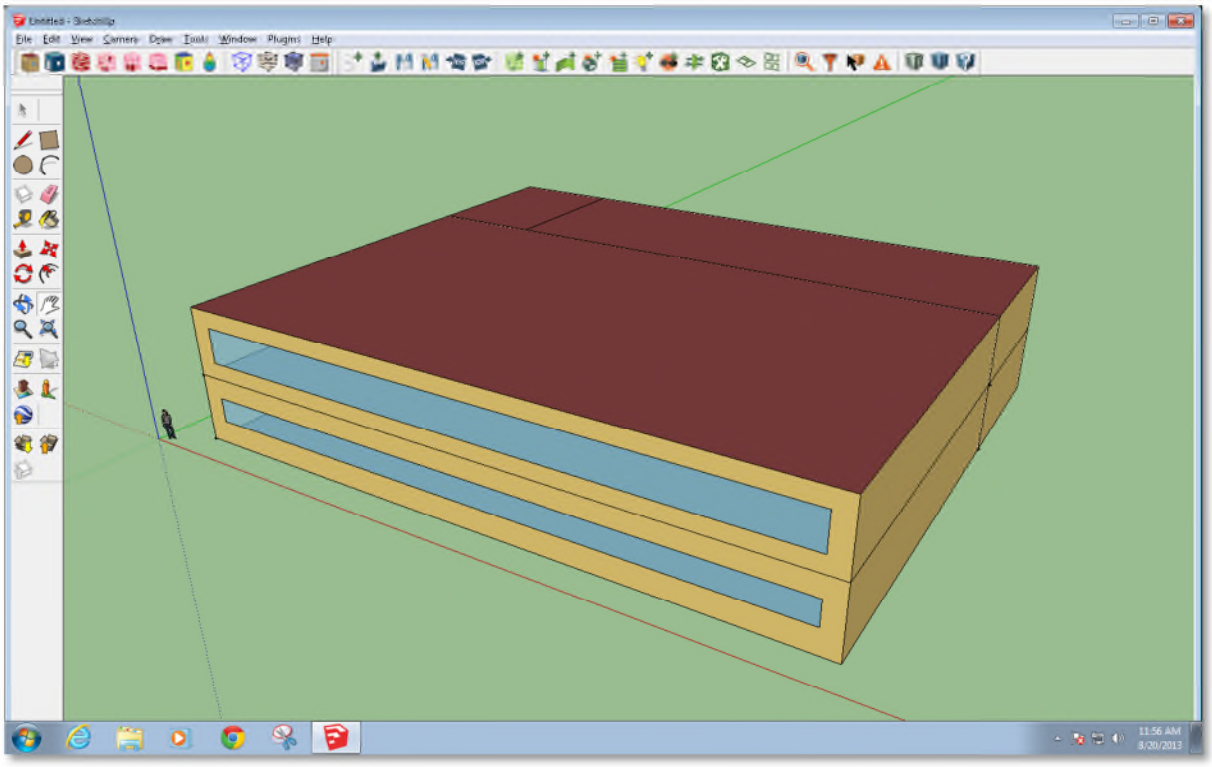


Figure 6 – Example Building Created With the OpenStudio Plug-In

Exporting the Model to SDD XML

Once the building geometry has been created, export to SDD XML. The export function is located in the **Plugins** menu (refer to Figure 7). To access this menu, click:

Plugins→Export→Export SDD Model

Save the XML file to your project folder or other desired location.

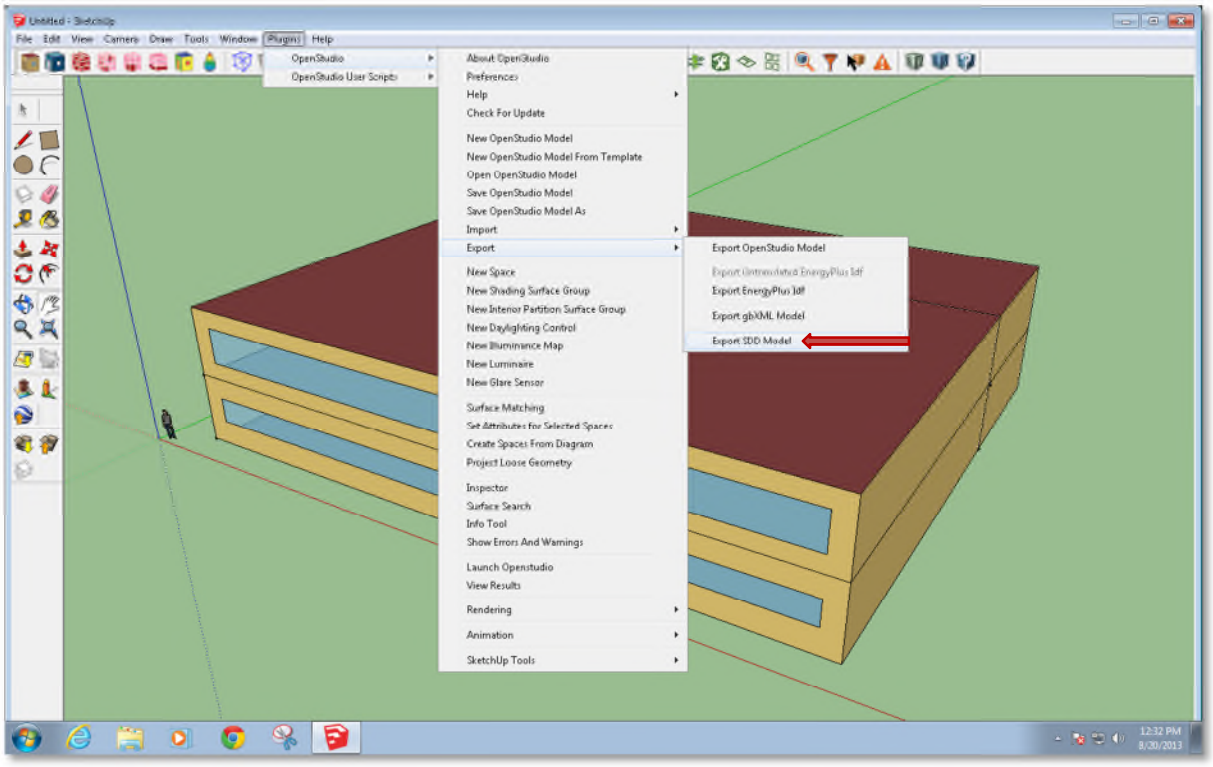


Figure 7 – Exporting the Model to SDD XML

STARTING A NEW PROJECT

When CBECC-Com is first started, a dialog box appears with three options (No. 2 option may not be available on new CBECC-Com installations):

1. Open Recent Project
2. Select an Existing Project to Open
3. Create a New Simplified Geometry Project

One of the first two options must be used when working on a *Detailed Geometry* project. The **Open Recent Project** option automatically selects the project that was being worked on the last time CBECC-Com was open. The **Select an Existing Project to Open** option requires browsing to the desired project. If **Select an Existing Project to Open** is selected, the default file type in the browser window is a .cibd file. However, an .xml file type can be selected, allowing the user to open an SDD XML file.

The third option should be used when using the *Simplified Geometry* approach. The **Create a New Simplified Geometry Project** option automatically walks the user through setting up the initial project parameters and building elements.

Users can take either approach (Detailed or Simplified) to modeling their project; however, the preferred workflow is to use the *Detailed Geometry* approach using OpenStudio to create building model geometry using SketchUp with the OpenStudio plug-in. OpenStudio includes an option for exporting an SDD file, which CBECC-Com can then open. The *Simplified Geometry* approach is recommended for simpler buildings since this approach comes with certain limitations that could prevent the project from getting credit for certain efficiency measures included in the design.

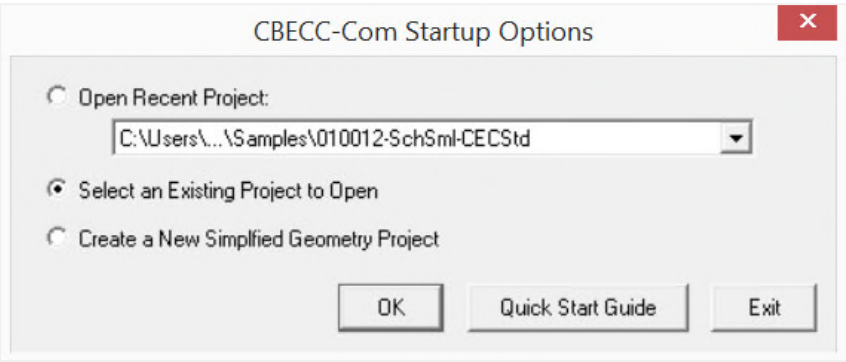
For more information on the recommended workflow, please view the tutorials at http://bees.archenergy.com/faq.html.

Using the Detailed Geometry Approach

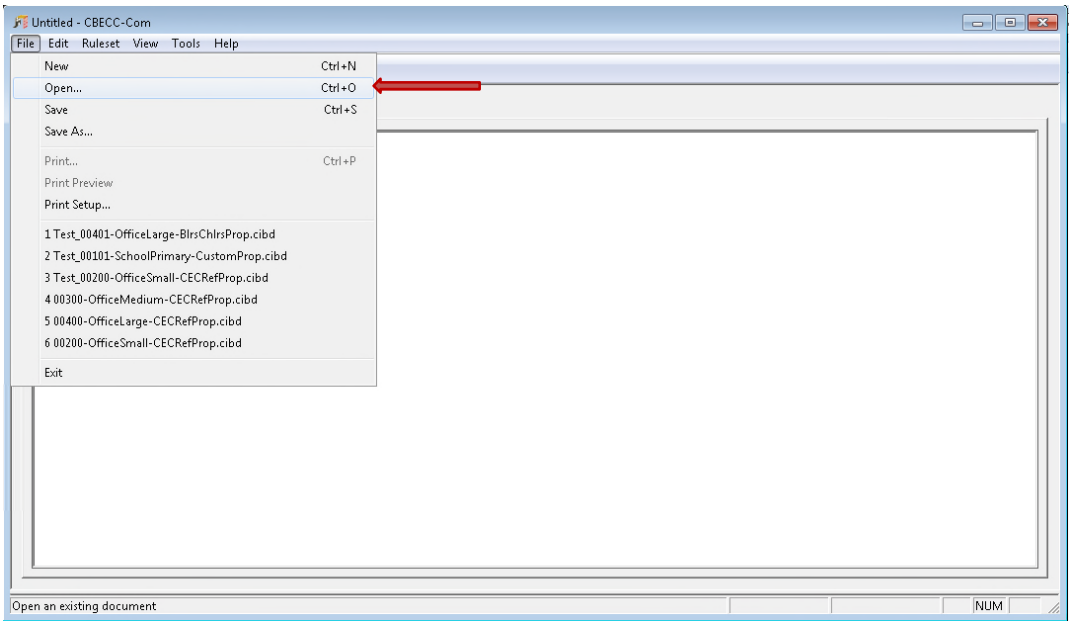
The *Detailed Geometry* approach uses the OpenStudio plug-in to generate building geometry. Through the OpenStudio plug-in, the user can export the geometry to SDD XML file format for input into the CBECC-Com user interface.

Importing Geometry into the CBECC-Com User Interface

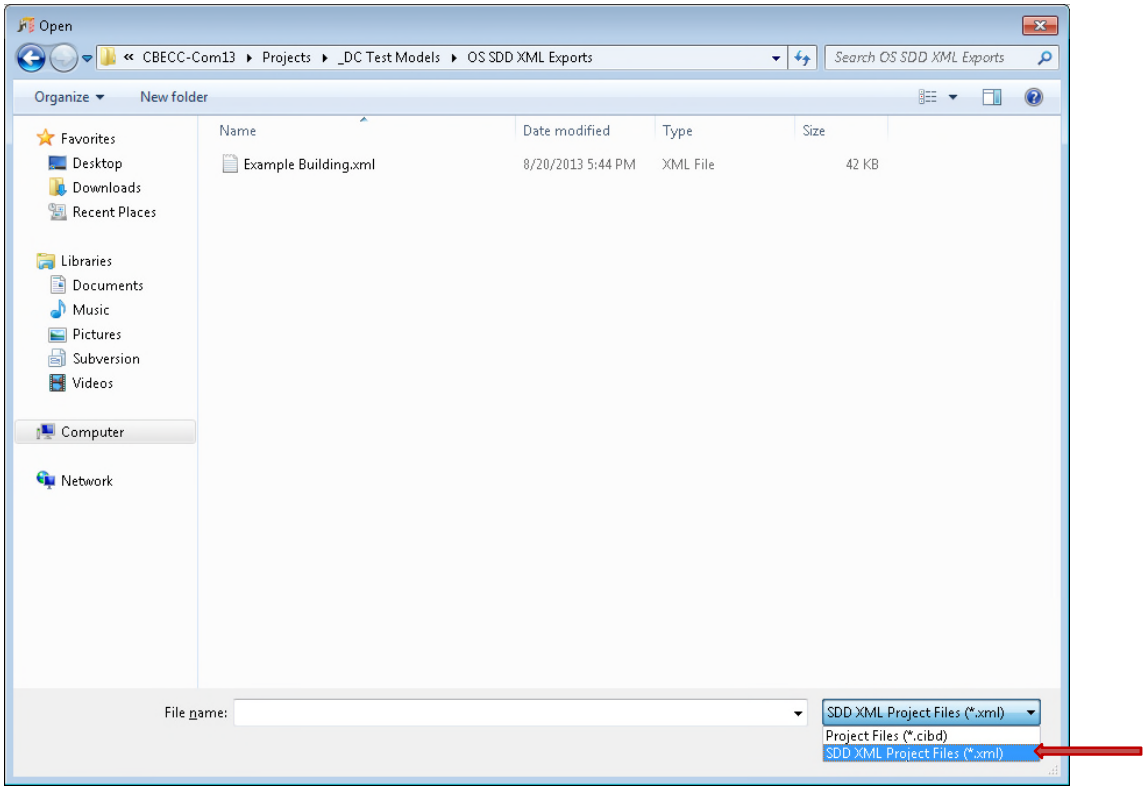
Launch CBECC-Com. On launch, a dialog box appears showing three startup options. Choose the **Select an Existing Project to Open** button, and click **OK.**



Alternatively, if CBECC is already open, then go to the **File** menu and click **Open…**



Go to the folder where you saved the SDD XML file. In the example below, see the drop-down list in the lower right corner. Select the file type **SDD XML Project Files. Open** and **Cancel** buttons appear. Click **Open** to import the file.



Using the Simplified Geometry Approach

The *Simplified Geometry* approach within the CBECC-Com graphical user interface (GUI) allows users to create a building model without specifying coordinates in space for building surfaces such as walls, roofs, and fenestration. The GUI allows a user to create building objects (surfaces) and their child objects by defining the characteristics that define that object without having to use any drawing tools such as SketchUp (with the OpenStudio plug-in). The inputs to define the building envelope components require the user to have detailed take-offs from the construction drawings for each of those components. For example, a wall is defined using area and azimuth; whereas, a roof surface is defined using area, azimuth and tilt. Fenestration is defined as a child of a wall or roof surface, and only an area is required, azimuth and tilt are taken from the parent surface.

The data used in the *Simplified Geometry* approach does not define the spatial relationships between the various surfaces, which can be found in the building geometry generated using drawing tools such as SketchUp with the OpenStudio plug-in (*Detailed Geometry* approach). As a result, using the *Simplified Geometry* approach has inherent limitations for compliance analysis.

The limitations of using the *Simplified Geometry* approach include not being able to model, or take credit for, certain features such as daylighting and daylighting controls. Since no daylighting can be modeled using the *Simplified Geometry* approach, projects submitting compliance documents for plan check need to make sure that their projects meet all the mandatory and prescriptive daylighting requirements.

Please note that CBECC-Com does not include the ability to mix the modeling inputs for building geometry using the *Simplified* and *Detailed Geometry* approaches, so project teams must choose one of the two modeling paths when doing compliance analysis.

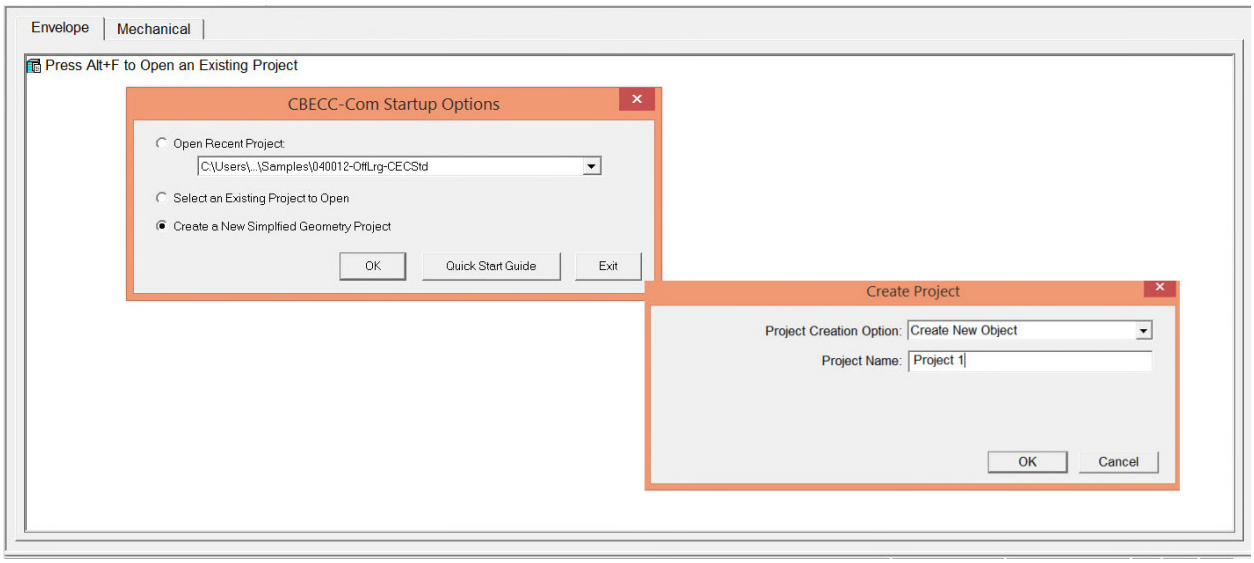
When developing a mode using the *Simplified Geometry* approach, the following requirements and recommendations for creating a valid model should be kept in mind:

- All exterior surfaces must be modeled.
- All interior surfaces separating conditioned from unconditioned spaces must be modeled.
- It is strongly recommended that floors be modeled for all spaces, including floors between conditioned spaces.
- If surfaces between spaces are included, the translation will create the corresponding surface in the adjacent space.
- It is not necessary to include interior walls between conditioned spaces, but it is allowed and the additional thermal mass may affect model results.

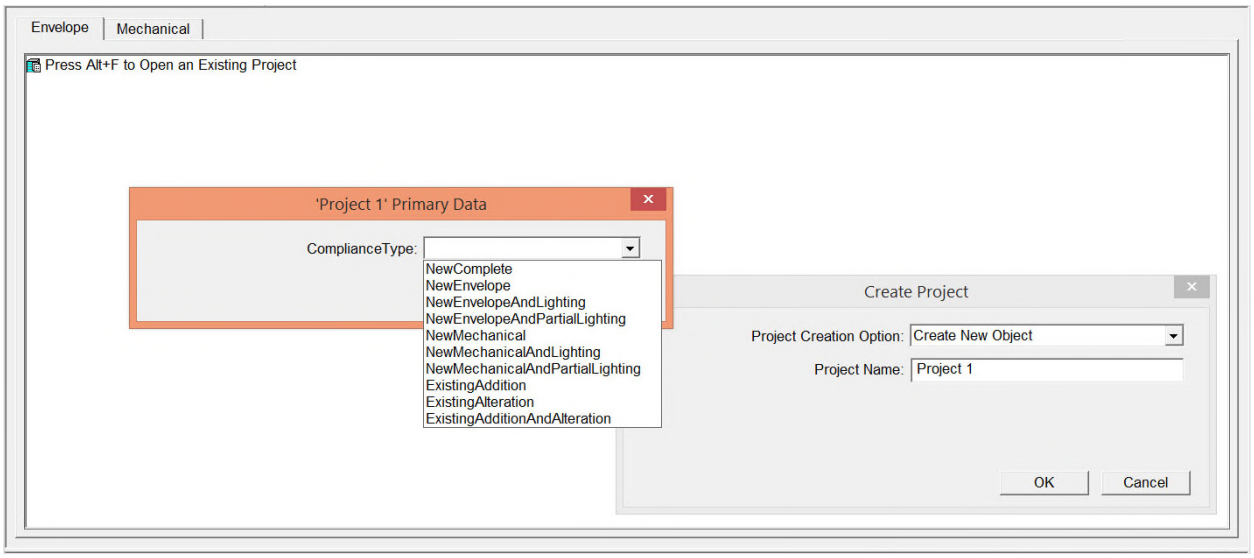
Creating a New Simplified Geometry Project

Launch CBECC-Com. Select **Create a New Simplified Geometry Project**. Click **OK**.

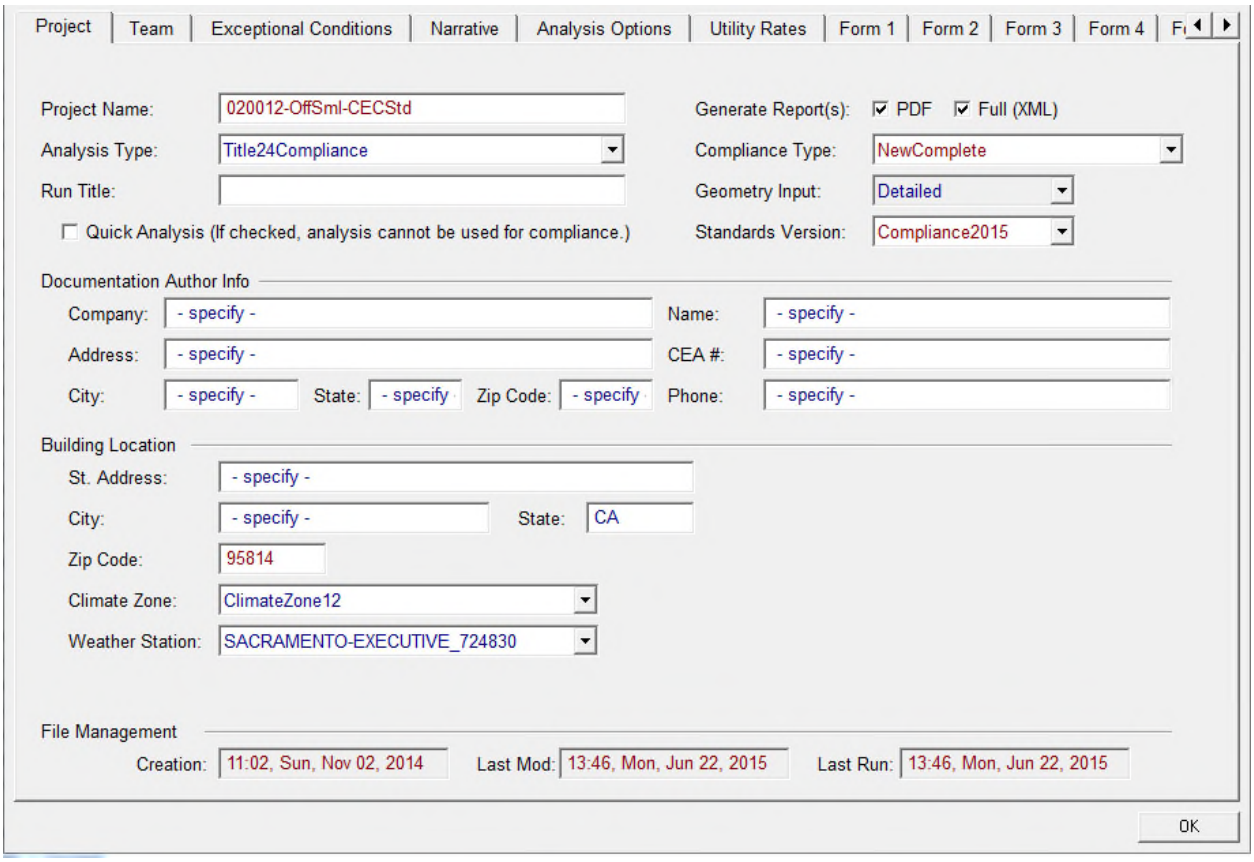
The **Create Project** dialog box appears. Enter the **Project Name** and click **OK.**



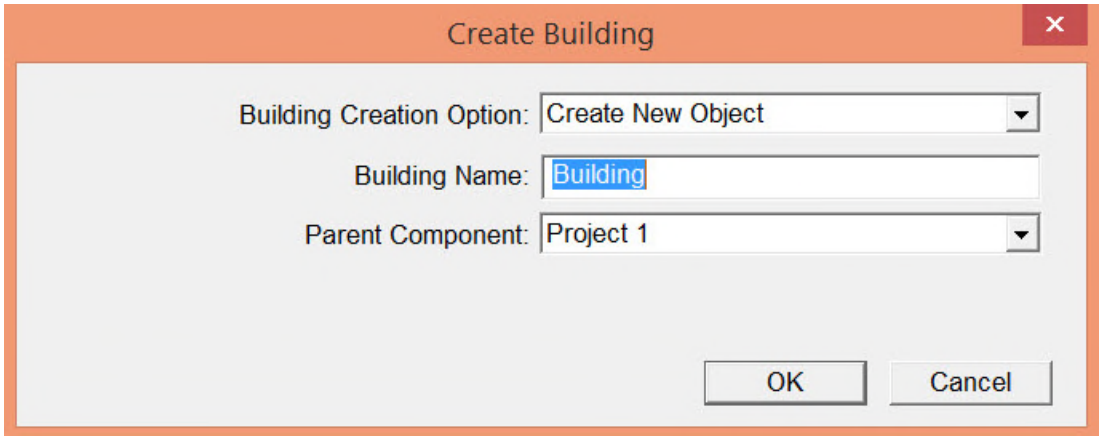
The **Primary Data** dialog box appears. Select the **ComplianceType** from the drop-down list and click **OK**.



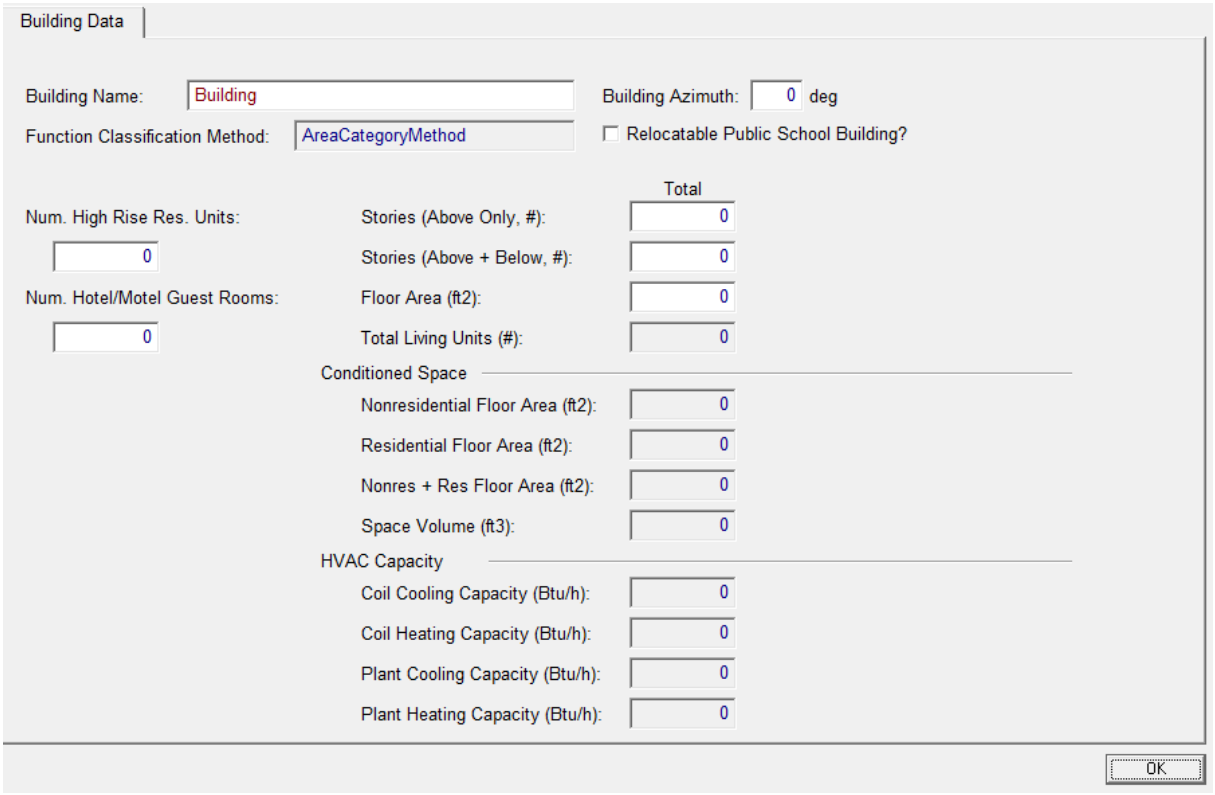
The **Project Data** tab in the **Building Model Data** screen appears. Enter the **Owner Info**, **Location** of the project, and the parameters.



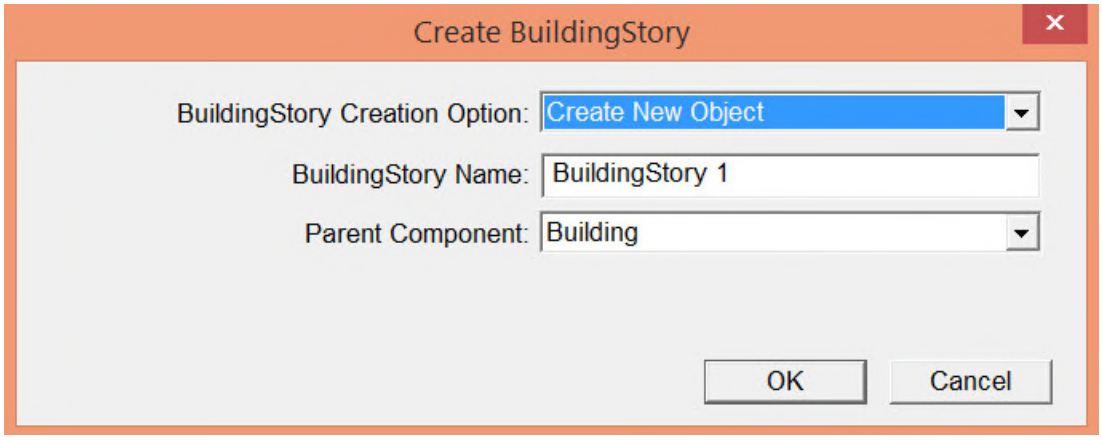
The **Create Building** dialog box appears. Enter the **Building Name** and click **OK**.



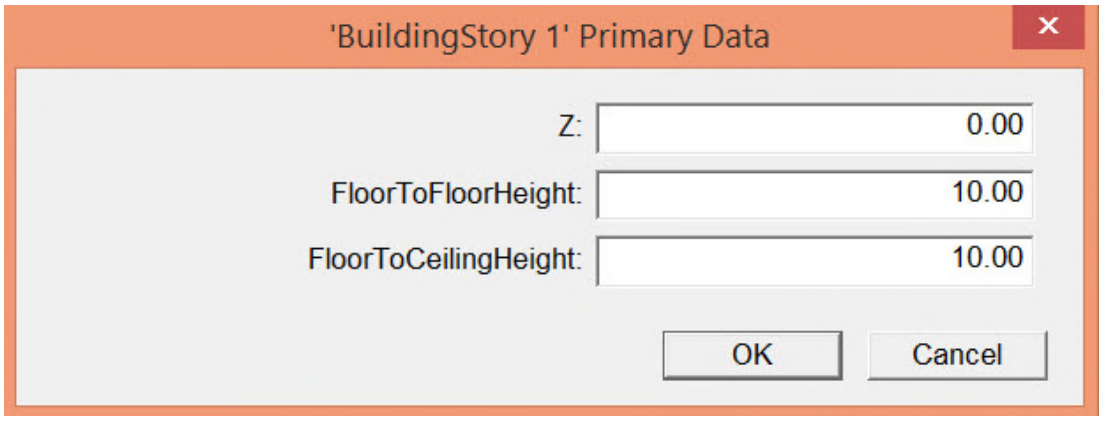
The **Building Data** dialog box appears. Enter the number of stories and click **OK**.



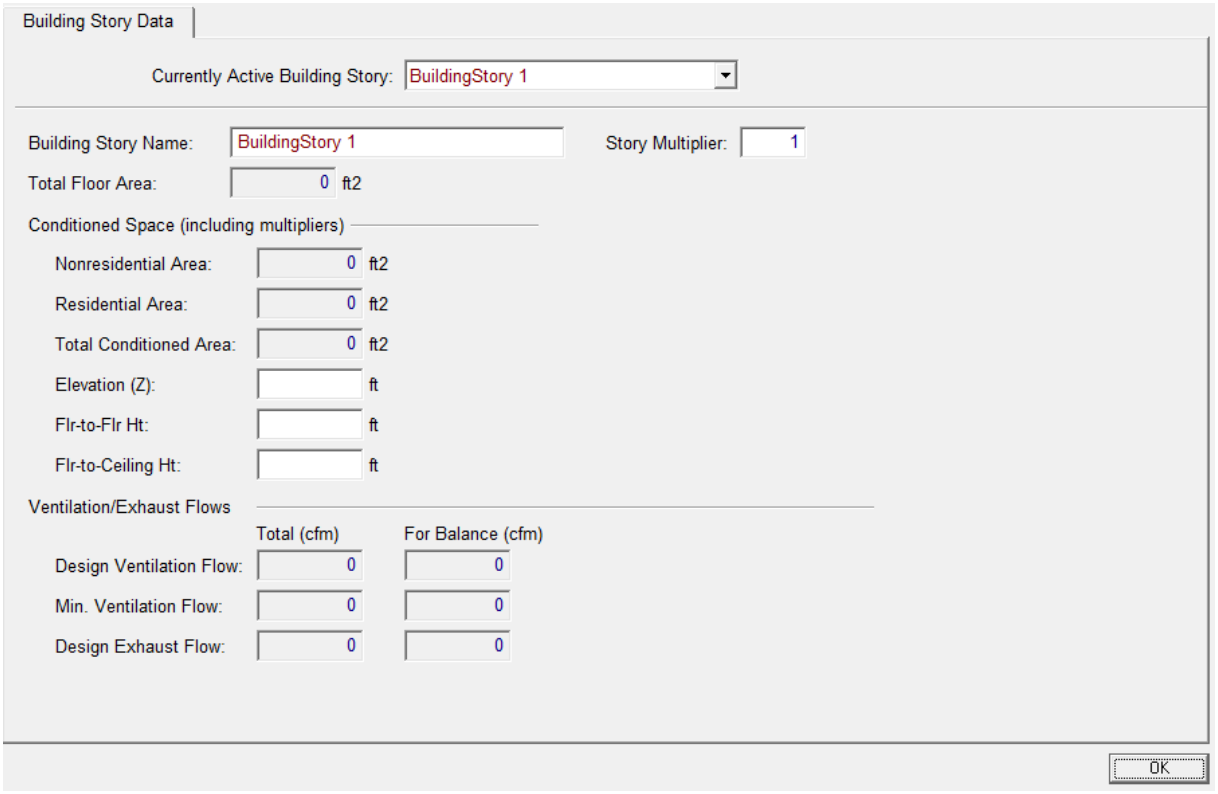
The **Create BuildingStory** dialog box appears. Enter a **BuildingStory Name** and click **OK**.



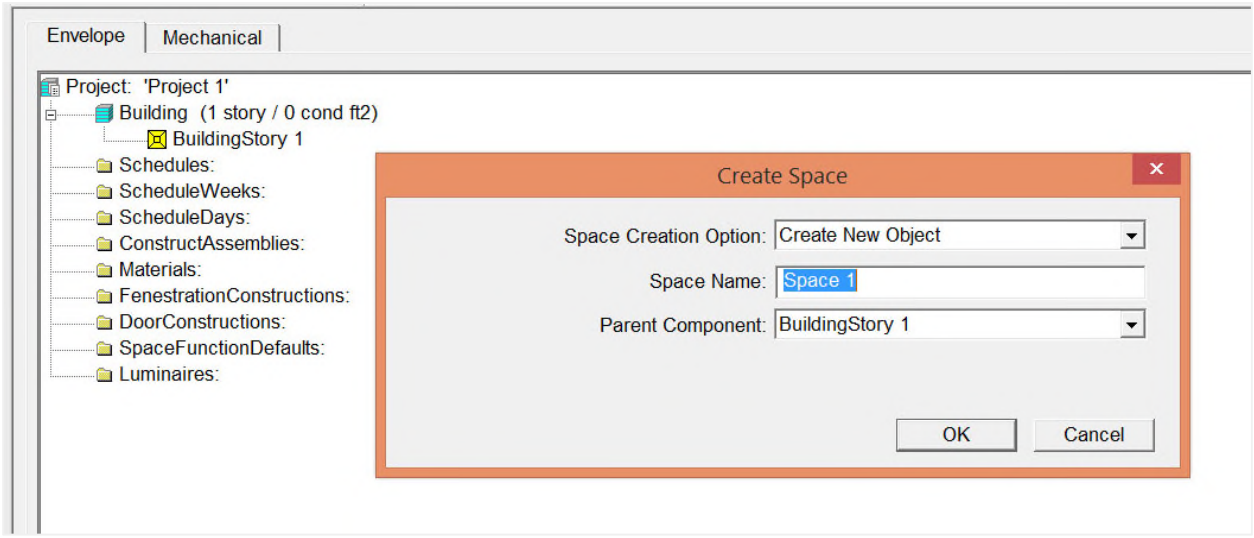
The BuildingStory **Primary Data** dialog box appears. Enter **Z** coordinate for the building story, the **FloorToFloorHeight** and the **FloorToCeilingHeight** in feet. Click **OK**.



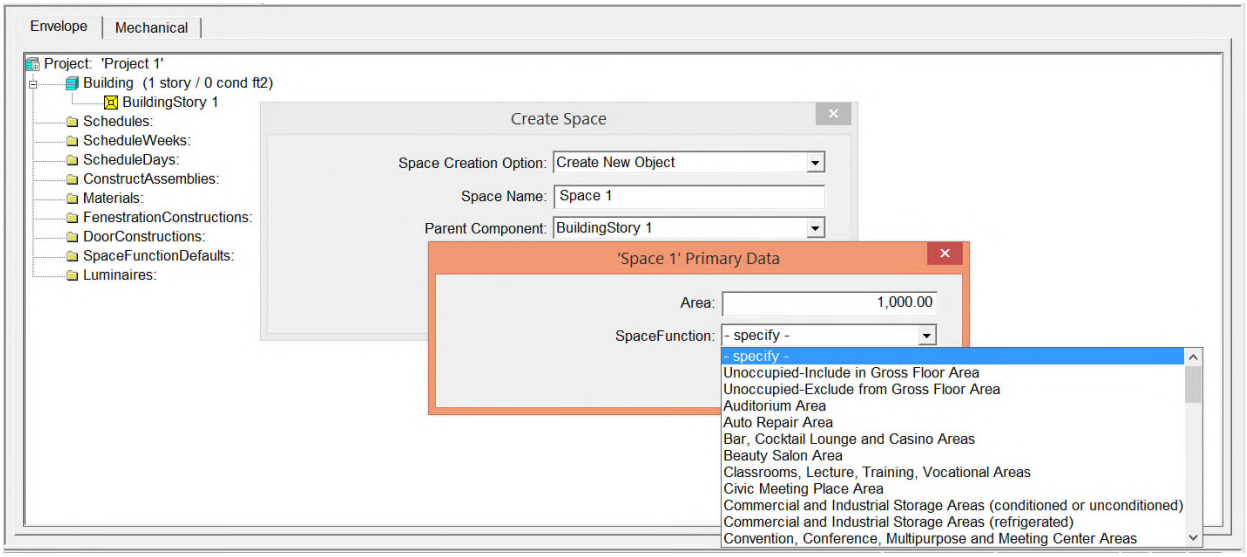
The **Building Story Data** tab appears. Verify input. Click **OK**.



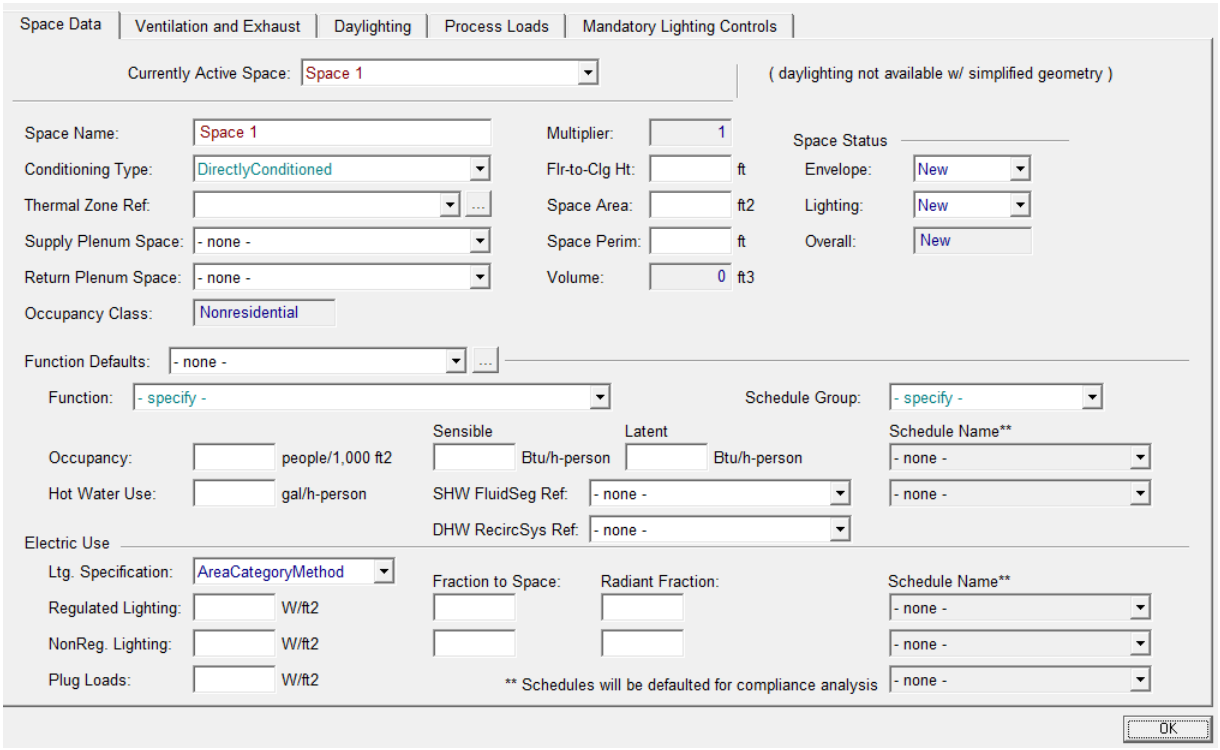
The **Create Space** dialog box appears. Enter the **Space Name** and click **OK**.



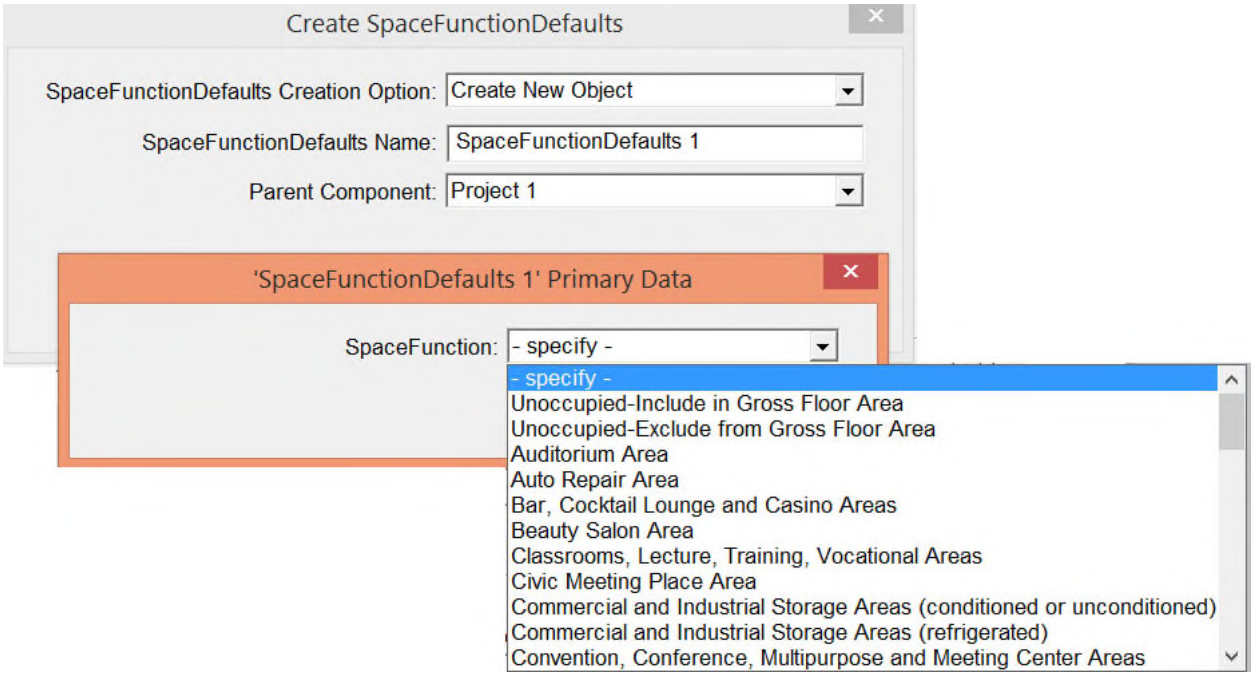
The Create Space **Primary Data** dialog box appears. Enter the **Area** for the space and select the **SpaceFunction** type from the drop-down list.



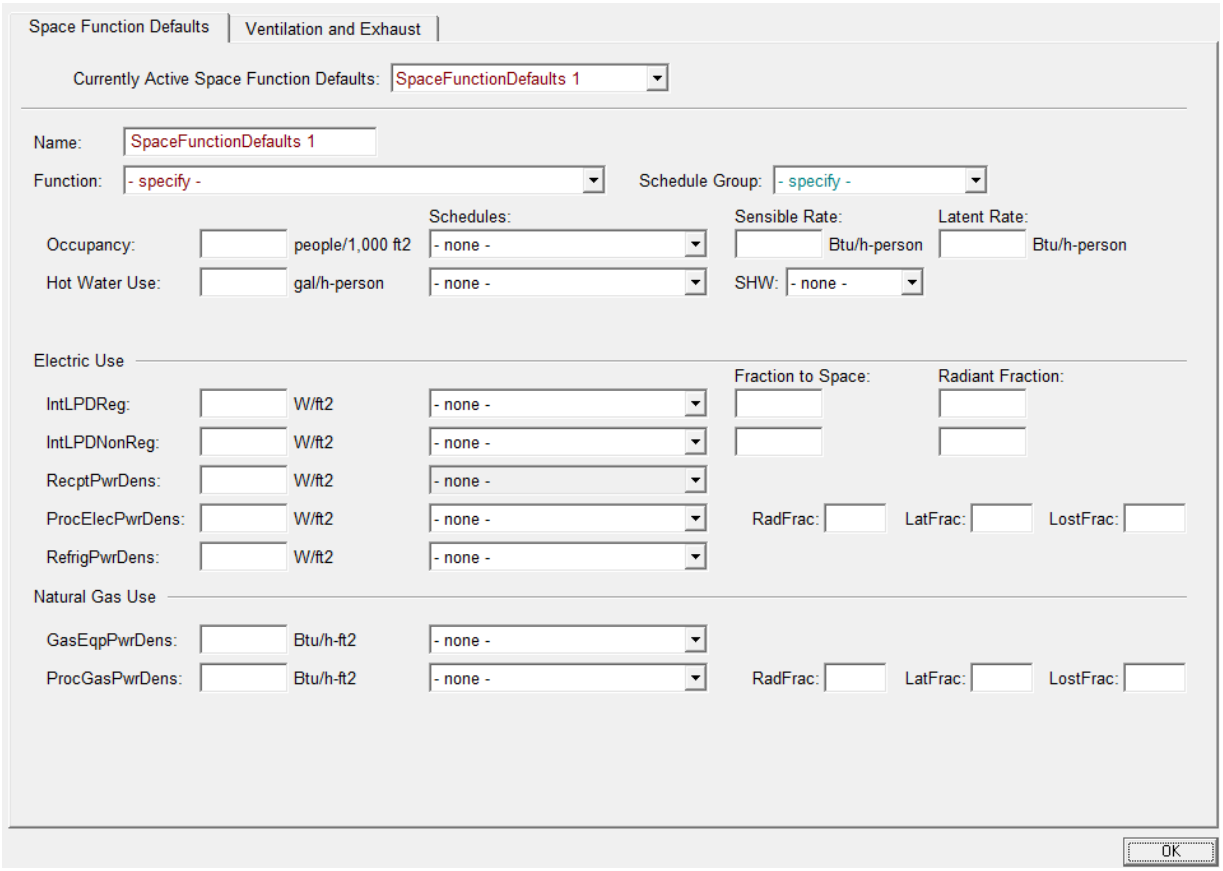
The **Space Data** tab appears. In **Function Defaults**, select **Create SpaceFunctionDefaults**. The **Create SpaceFunctionDefaults** dialog box appears. Select the **Creation Option** and **Parent Component**. Click **OK.**



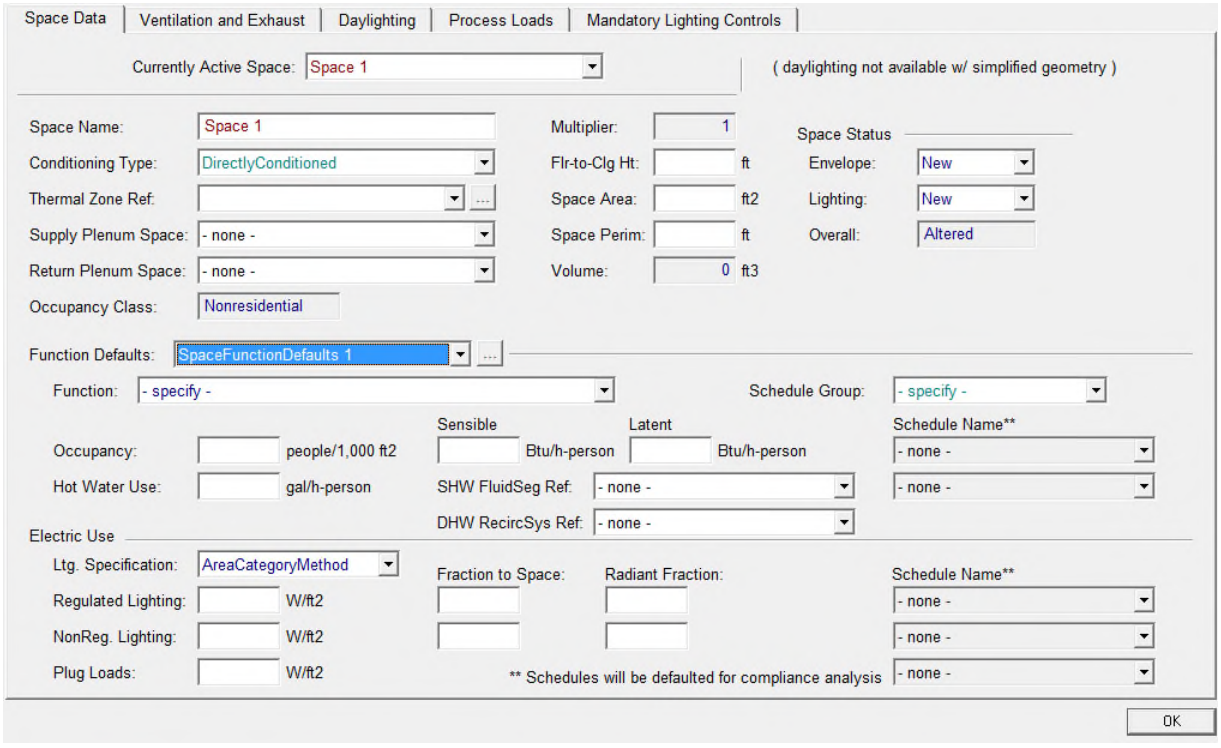
The SpaceFunctionDefaults **Primary Data** dialog box appears. Select the **SpaceFunction** and click **OK**.


Create SpaceFunctionDefaults
SpaceFunctionDefaults Creation Option: Create New Object
SpaceFunctionDefaults Name: SpaceFunctionDefaults 1
Parent Component: Project 1
'SpaceFunctionDefaults 1' Primary Data
SpaceFunction: - specify -
- specify -
Unoccupied-Include in Gross Floor Area
Unoccupied-Exclude from Gross Floor Area
Auditorium Area
Auto Repair Area
Bar, Cocktail Lounge and Casino Areas
Beauty Salon Area
Classrooms, Lecture, Training, Vocational Areas
Civic Meeting Place Area
Commercial and Industrial Storage Areas (conditioned or unconditioned)
Commercial and Industrial Storage Areas (refrigerated)
Convention, Conference, Multipurpose and Meeting Center Areas

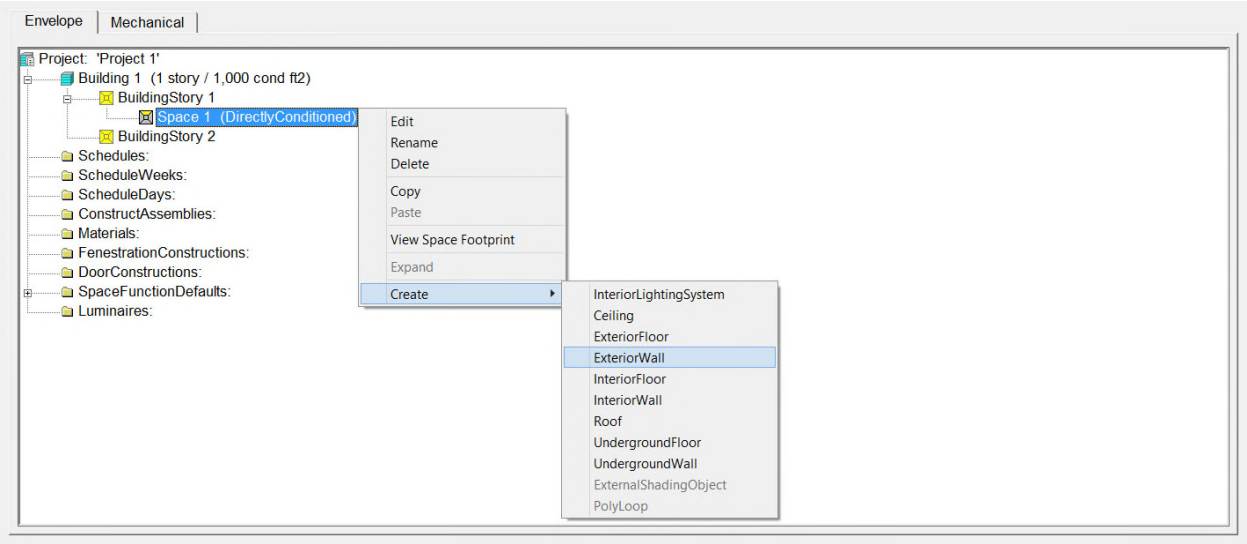
The **Space Function Defaults** tab appears. Assign the data and click **OK.**


Space Function Defaults
Ventilation and Exhaust
Currently Active Space Function Defaults: SpaceFunctionDefaults 1
Name: SpaceFunctionDefaults 1
Function: - specify -
Schedule Group: - specify -
Schedules:
Sensible Rate:
Latent Rate:
Occupancy: people/1,000 ft2 - none - Btu/h-person Btu/h-person
Hot Water Use: gal/h-person - none - SHW: - none -
Electric Use
Fraction to Space:
Radiant Fraction:
IntLPDReg: W/ft2 - none -
IntLPDNonReg: W/ft2 - none -
RecptPwrDens: W/ft2 - none -
ProcElecPwrDens: W/ft2 - none - RadFrac: LatFrac: LostFrac:
RefrigPwrDens: W/ft2 - none -
Natural Gas Use
GasEqpPwrDens: Btu/h-ft2 - none -
ProcGasPwrDens: Btu/h-ft2 - none - RadFrac: LatFrac: LostFrac:
OK

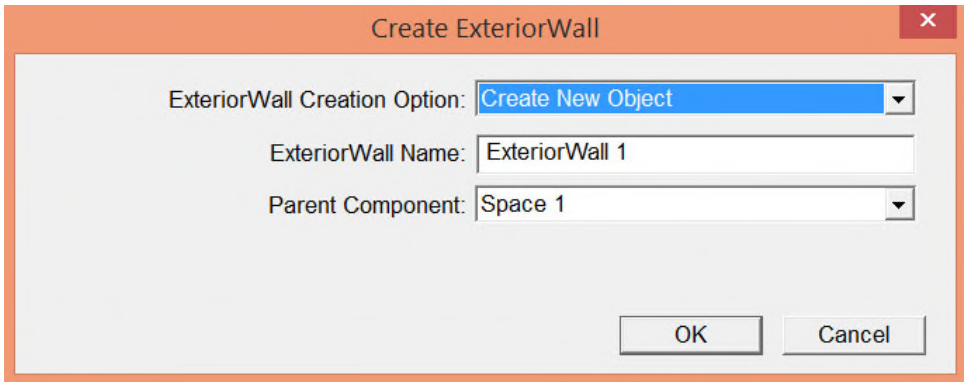
The **Space Data** tab appears. Verify **Function Defaults** and click **OK.**



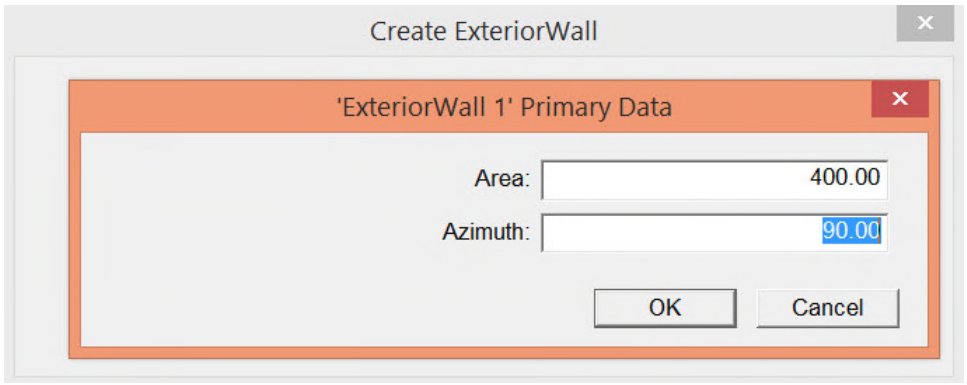
To create geometry surfaces (child objects), right click on the Space name (parent component) in the Project tree. For example, right click on the **BuildingStory** and select **Create** and then click **Exterior Wall.**



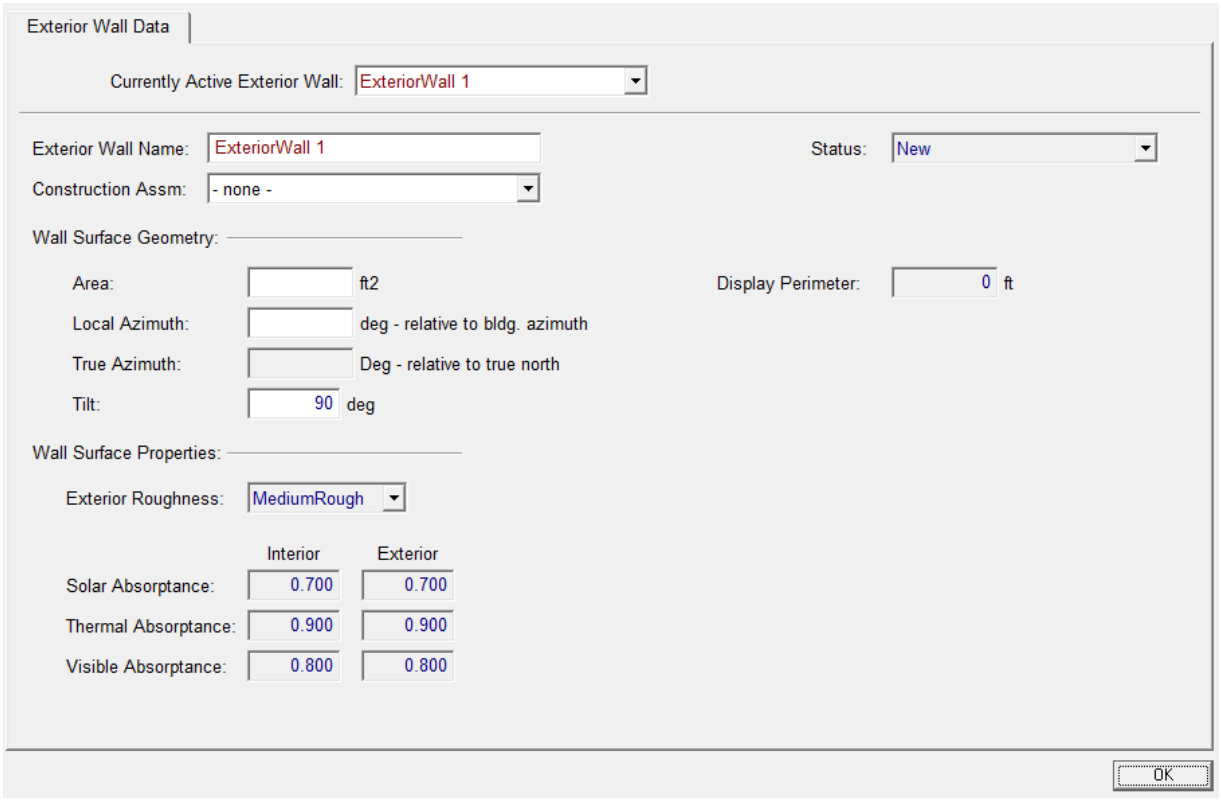
The **Create ExteriorWall** dialog box appears. Select the **Creation Option** and **Parent Component** and click **OK.**



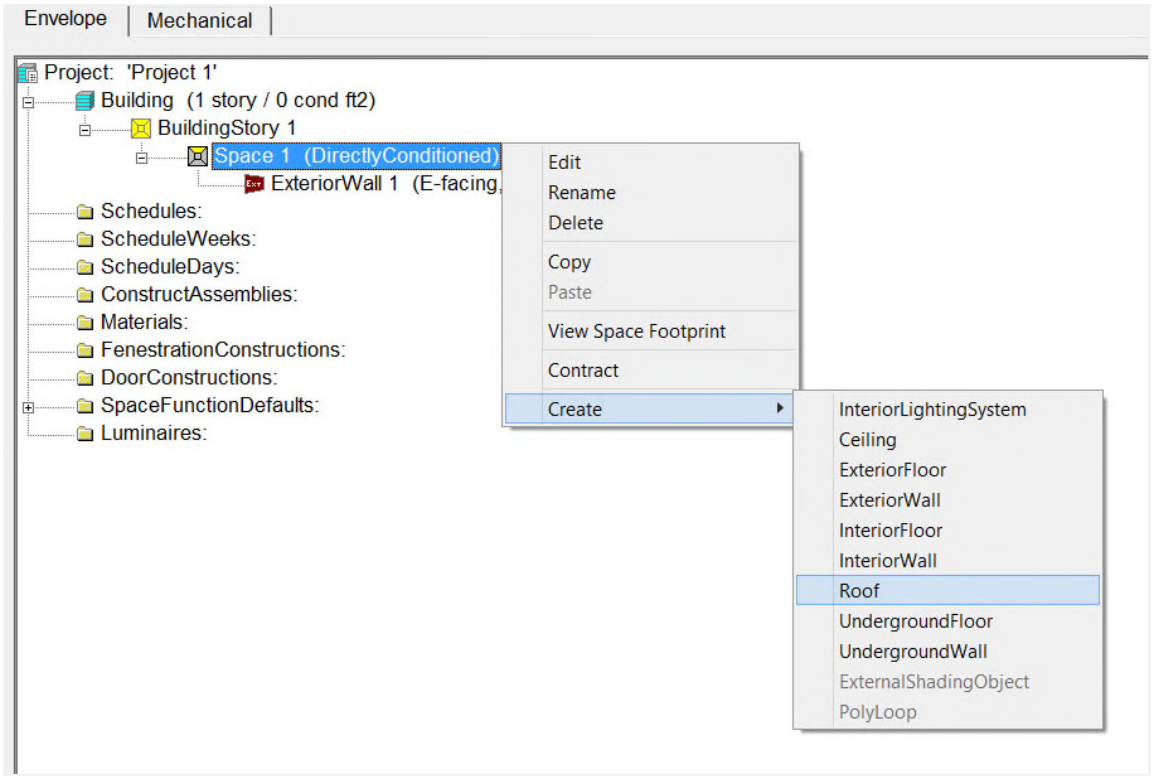
The ExteriorWall **Primary Data** dialog box appears. Enter the **Area** and **Azimuth** for the exterior wall and click **OK**.



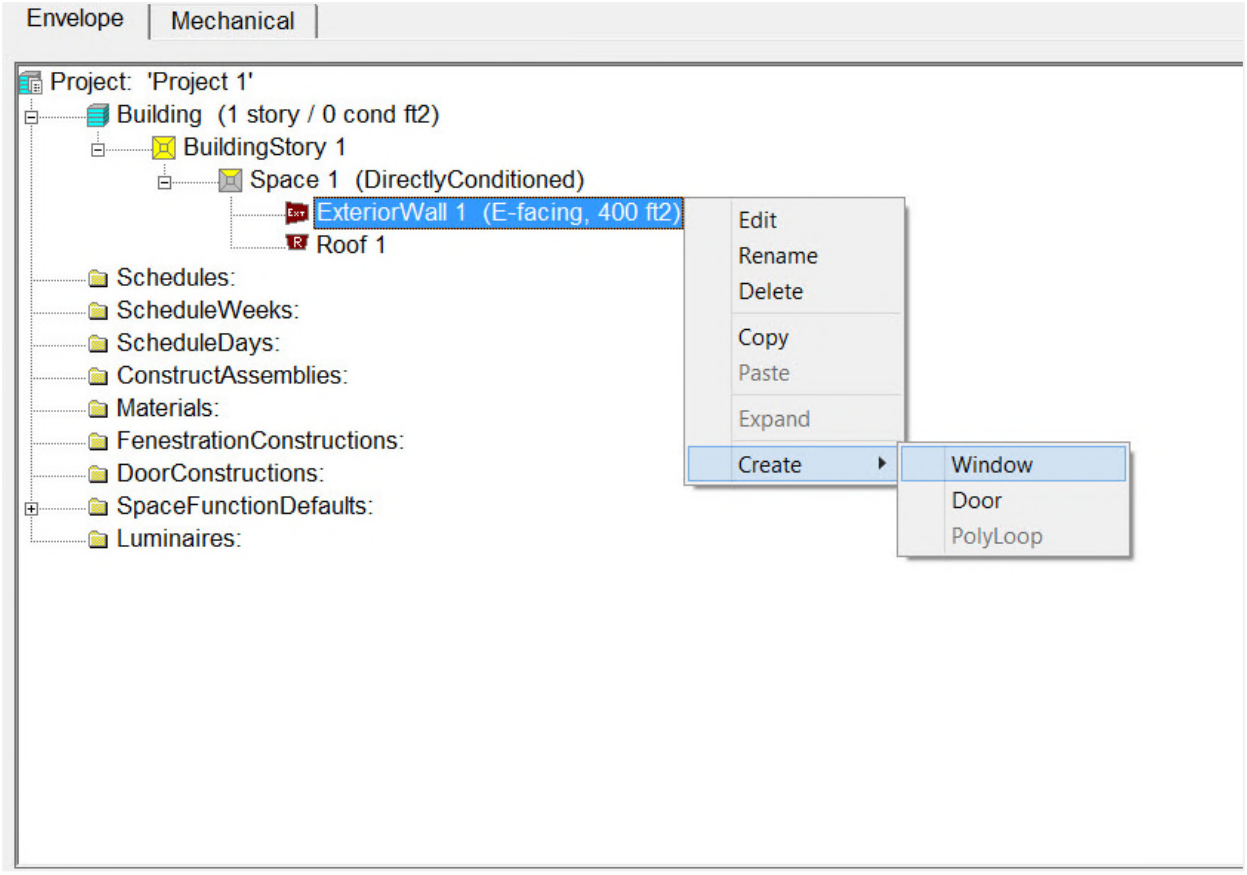
The **Exterior Wall Data** tab appears. In **Construction Assm**, create construction data. Enter values and click **OK.** The Exterior Wall (Exterior Wall icon) appears in the Project tree below Space.



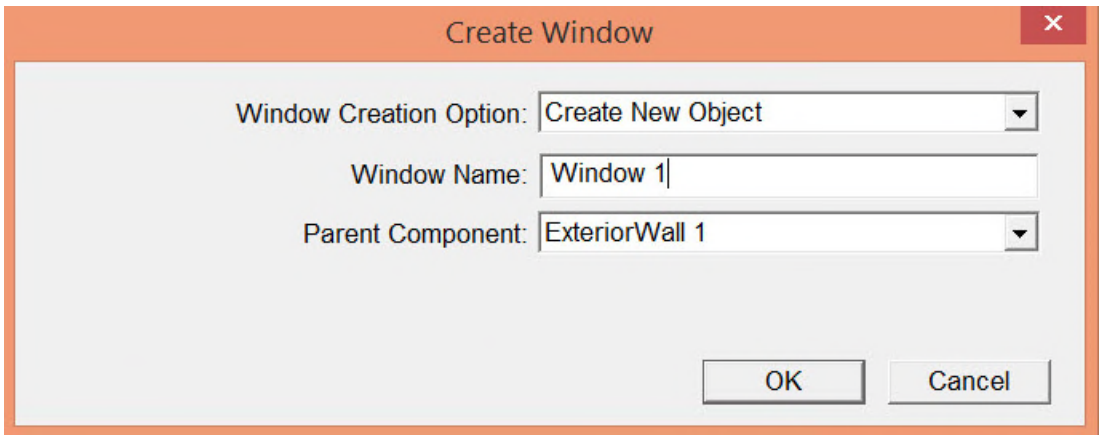
Create **Roof** (and other geometry surfaces such as interior walls and floors) in the Space. The Roof (Roof icon) appears in the Project tree.



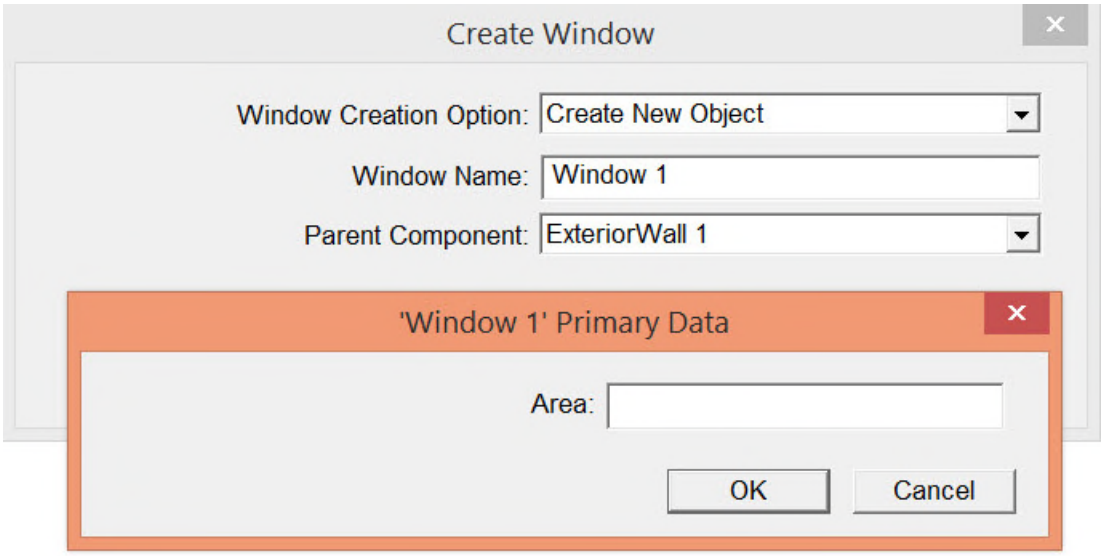
To create **Window**, right click on **Exterior Wall** in the Project tree. Select **Create** and then select **Window**.



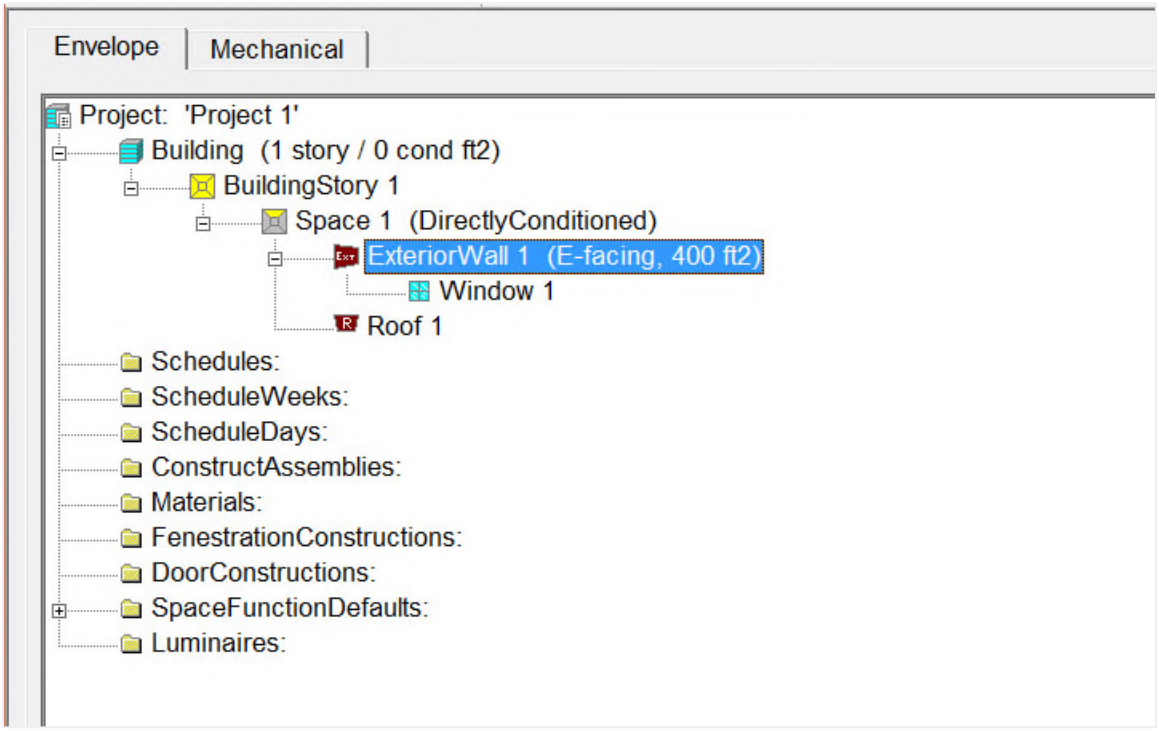
The **Create Window** dialog box appears. Enter **Window** name and click **OK**.



The Window **Primary Data** dialog box appears. Enter the **Window** area and click **OK.** The **Window** (Window icon) appears in the Project tree under **Exterior Wall.**



At this point, the Project tree is populated as shown below.



THE CBECC-COM USER INTERFACE

Once the building geometry is input, the model information is presented in the CBECC-Com user interface. The data is organized in a tree structure that is defined by the Standards Data Dictionary (SDD) data model.

The highest level of the tree is the *Project*. The next level (the "child" of the *Project*) is the *Building*. Beneath the *Building* level are two main categories of data: Envelope and Mechanical.

The Envelope data encompasses the geometry of the building, the properties of the building's construction materials, the spaces in the building, and the thermal gains within each space.

The Mechanical data encompasses all of the air and water systems in the building, which zones they serve and how they operate.

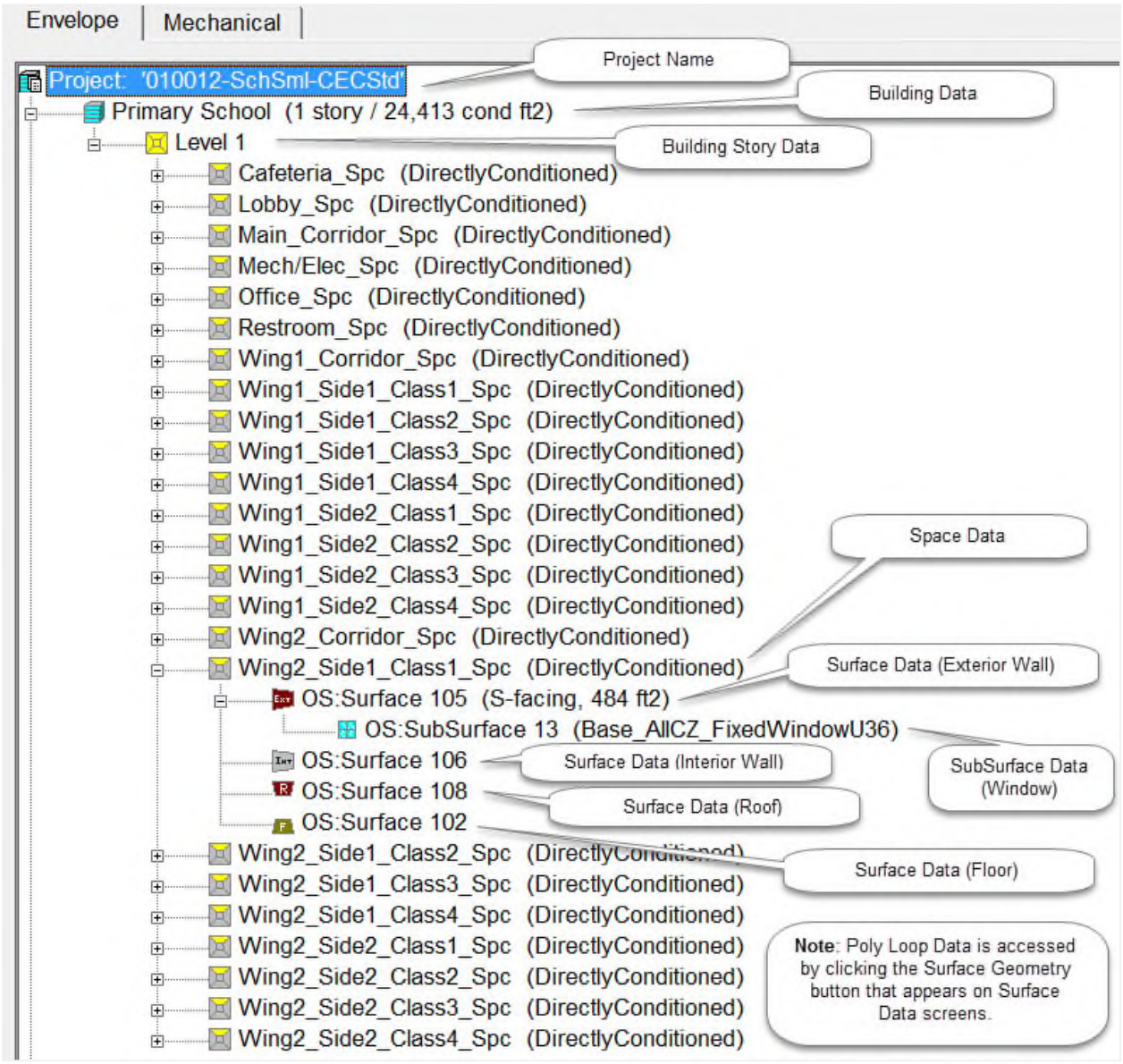
The Envelope and Mechanical data are input on two separate tabs in the user interface. A detailed summary of the model hierarchy on each tab is presented below. Each item on the model tree is an editable object. A user can edit an object's properties (in an input screen) by double clicking it with the mouse, or right-clicking **Edit** on the main menu. Additionally, a user can create child objects by right-clicking the parent and selecting **Create,** and then clicking the desired child object.

Tip: Input Units

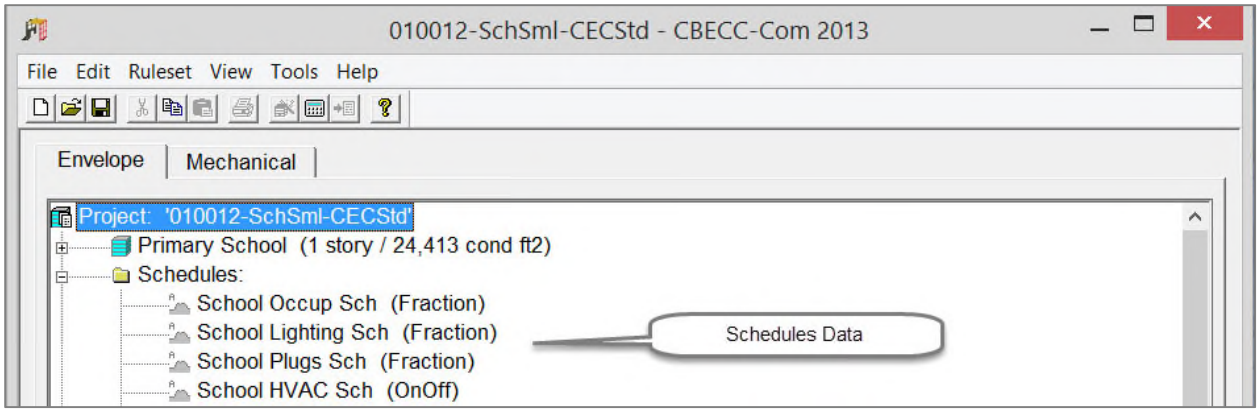
The input screens show the units for numerical inputs. For example, boiler efficiency is input as a decimal like 0.8, not as a percent (%) like 80.

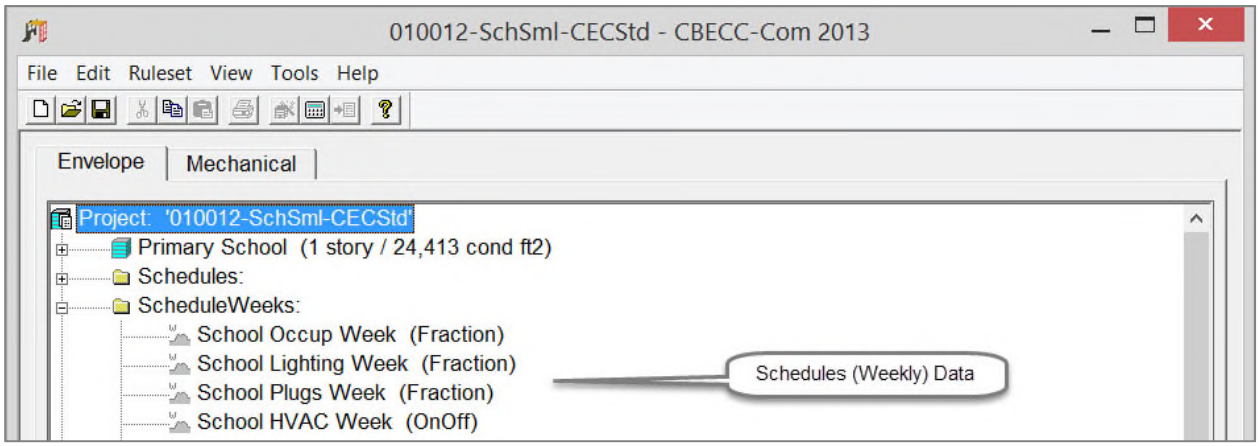
For a detailed description of the software menus and toolbar, please refer to the CBECC-Com_QuickStartGuide.pdf that can be accessed on the **Help** menu by clicking **Quick Start Guide**.

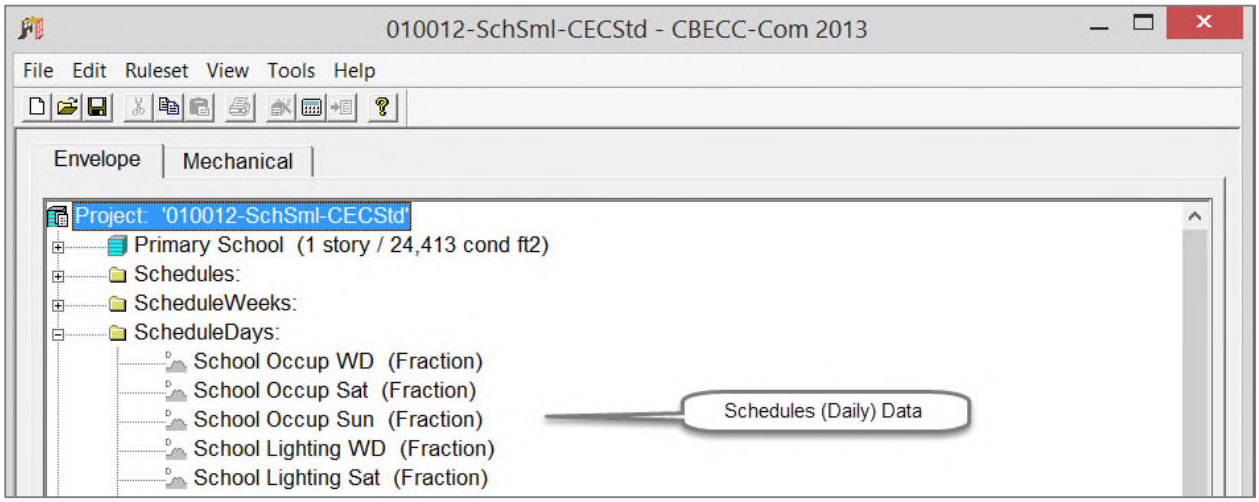
Organization of the Envelope Tab



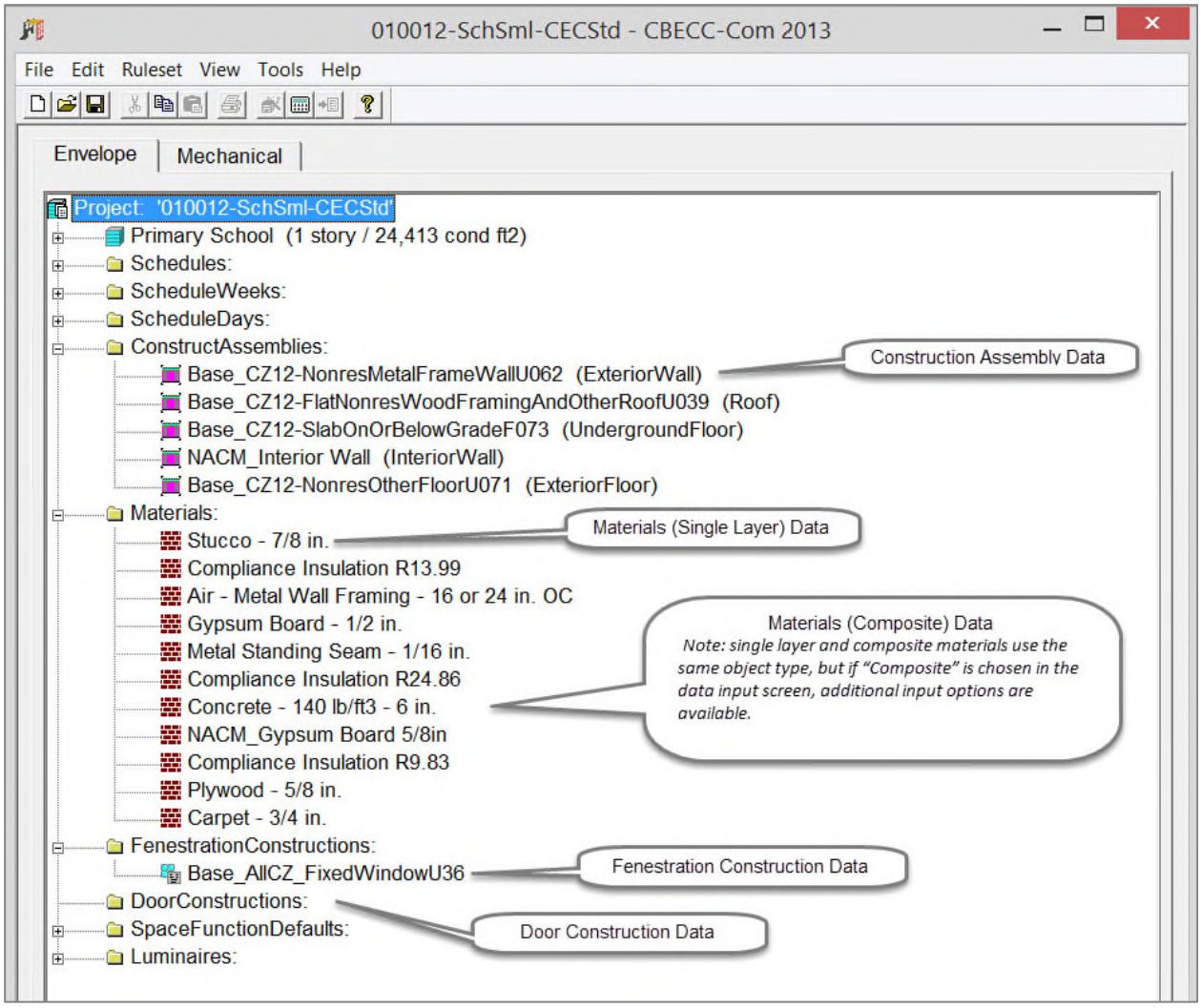
Organization of the Envelope Tab (continued)



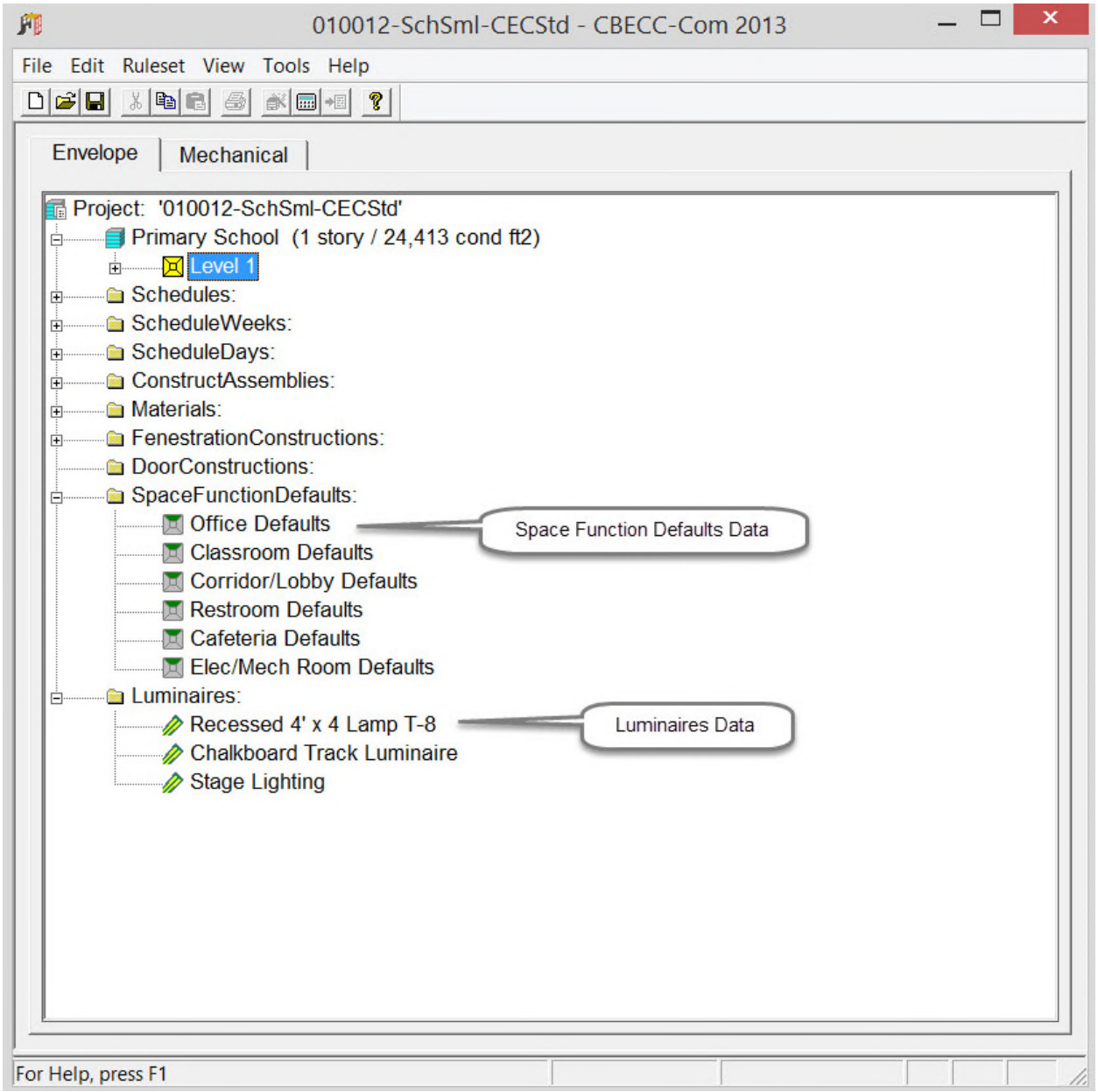




Organization of the Envelope Tab (continued)



Organization of the Envelope Tab (continued)

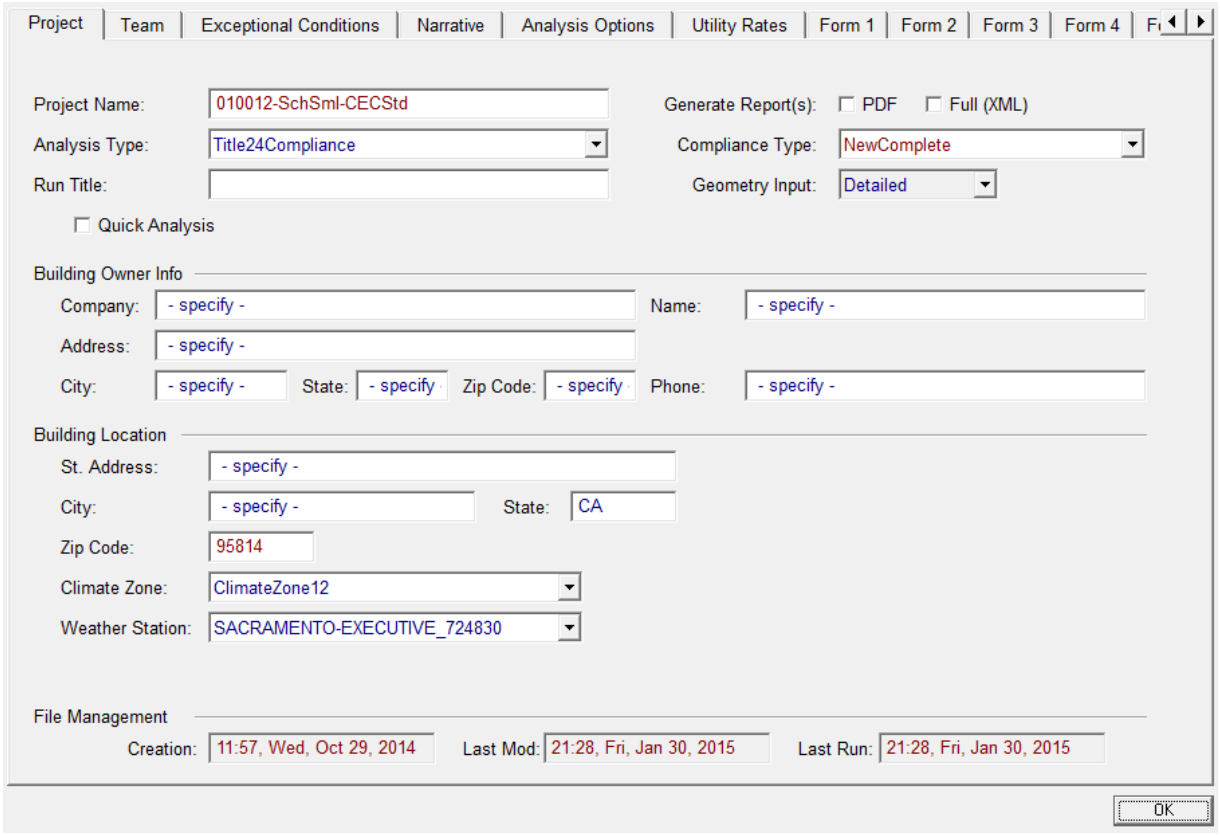


Envelope Input Screen Details

The Envelope Input Screen contains four tabs: Project Data, Design Team, Exceptional Conditions, and Non-Compliance Analysis. See each screen and its input information below.

Project Data Screen (Project Tab)

To access this screen, in the **Envelope** tab double click the Project name (Project Data icon). The **Project** data tab (the first tab in Project Data) appears.



Input summary for the Project data screen:

- **Project Name**: Name used for the project, if one is applicable.
- **Analysis Type**: Select the type of analysis to be performed. Options are Title24Compliance, Title24ProposedOnly, and Research.
- **Run Title**: Enter the title that appears on reports to identify this analysis (input is optional).
- **Generate Report(s)**: Check PDF or Full (XML) (for Title24Compliance only).
- **Compliance Type**: Type of compliance analysis (input is compulsory).
  - **NewComplete—**an all new, completely specified building. The building design includes the building envelope, lighting systems and HVAC systems. The proposed simulation model is based on user input, while the baseline simulation model will include envelope, lighting and HVAC systems that are generated by the software based on the ACM rules.
  - **NewEnvelope—**an all new building with only the envelope design completed. This form of compliance might be used for a speculative office building where design of the lighting and HVAC systems is waiting for tenant input. In this type of compliance, the

proposed and baseline simulation models will include lighting and HVAC systems that are generated by the software based on the ACM rules.

- **NewEnvelopeAndLighting—**an all new building with the envelope and lighting design completed. This form of compliance might be used for a speculative office building where design of the HVAC systems is waiting for tenant input. In this type of compliance, the proposed and baseline simulation models will include HVAC systems that are generated by the software based on the ACM rules.
- **NewEnvelopeAndPartialLighting—**an all new building with the envelope and part of the lighting design completed. This form of compliance might be used for a speculative office building where design of the lighting systems in tenant spaces and all of the HVAC systems are waiting for tenant input. In this type of compliance, the proposed and baseline simulation models will include HVAC systems that are generated by the software based on the ACM rules. The baseline simulation model will have all lighting generated by the rules, and the proposed model will include lighting systems generated by the rules for those areas where a lighting design has not been specified by the user.
- **NewEnvelopeAndMechanical—**an all new building with lighting design has been previously approved and approval is now being sought for the envelope and HVAC system. In this type of compliance, the proposed and baseline simulation models will both include lighting based on user input. The proposed model envelope and HVAC system will be based on user input but the baseline will be generated by the software based on the ACM rules.
- **NewMechanical—**an all new building where the envelope and lighting design has been previously approved and approval is now being sought for the HVAC system. In this type of compliance, the proposed and baseline simulation models will both include envelope and lighting based on user input. The proposed model HVAC system will be based on user input but the baseline will be generated by the software based on the ACM rules.
- **NewMechanicalAndLighting—**an all new building where the envelope has been previously approved and approval is now being sought for the lighting and HVAC systems. In this type of compliance, the proposed and baseline simulation models will both include the envelope based on user input. The proposed model lighting and HVAC systems will be based on user input but for the baseline these will be generated by the software based on the ACM rules.
- **NewMechanicalAndPartialLighting—**an all new building where the envelope and part of the lighting system has been previously approved and approval is now being sought for the remainder of the lighting and all of the HVAC systems. In this type of compliance, the proposed and baseline simulation models will both include envelope and the previously approved lighting based on user input. The proposed model will include the remaining lighting and all HVAC systems based on user input but for the baseline these will be generated by the software based on the ACM rules.
- **ExistingAddition—**an all new addition to an existing building, with no alterations to the existing building. The user model must include all of the addition and may include some or all of the existing building. The addition is simulated in the same way as for a NewComplete analysis, while any modeled portions of the existing building are included in both the proposed and baseline simulation models based on user input.
- **ExistingAlteration—**an existing building where envelope, lighting or HVAC systems are being altered or replaced, with no increase in building floor area. The proposed simulation is based on user input. The baseline simulation model will be based on user input for those portions marked as existing, while new or altered components will be

replaced with software generated components based on the ACM rules. The simulation must include all altered portions of the building, as well as all existing, unaltered portions of the building which are served by HVAC systems that also serve altered portions. The simulation models may also include all or part of the remaining existing, unaltered portions of the building.

- **ExistingAdditionAndAlteration—**an all new addition to an existing building which is also being altered. This is a combination of ExistingAddition plus ExistingAlteration, and the rules for those compliance types apply.

- **Geometry Input**: Whether building geometry inputs are in 3D (detailed) or are area/azimuths (simplified).
- **Quick Analysis**: Check to enable the Quick Analysis feature. This feature decreases the amount of time required to run a compliance simulation in CBECC-Com 2013 by using a method identified by the Pacific Northwest National Laboratory (PNNL) to simulate 4 weeks of hourly weather data (one week in each season) instead of 52 weeks. (Find the PNNL paper at: https://www.ashrae.org/File%20Library/docLib/Events/ASHRAE-IPBSA-USA/Presentations/05_Athalye.pdf). Quick Analysis uses the 13th, 26th, 39th, and 52nd weeks in a weather file because that set of weeks was found to minimize the differences between annual and Quick Analysis TDV energy results. The results from Quick Analysis may vary from the full annual simulation, so Quick Analysis cannot be used for your final compliance analysis and permitting.

Building Owner Info section

- **Company**: Building owner's company.
- **Name**: Building owner's primary contact name.
- **Address**: Building owner's primary address.
- **City**: Building owner's city.
- **State**: Building owner's state.
- **Zip Code**: Building owner's ZIP code.
- **Phone**: Building owner's primary contact phone.

Building Location section

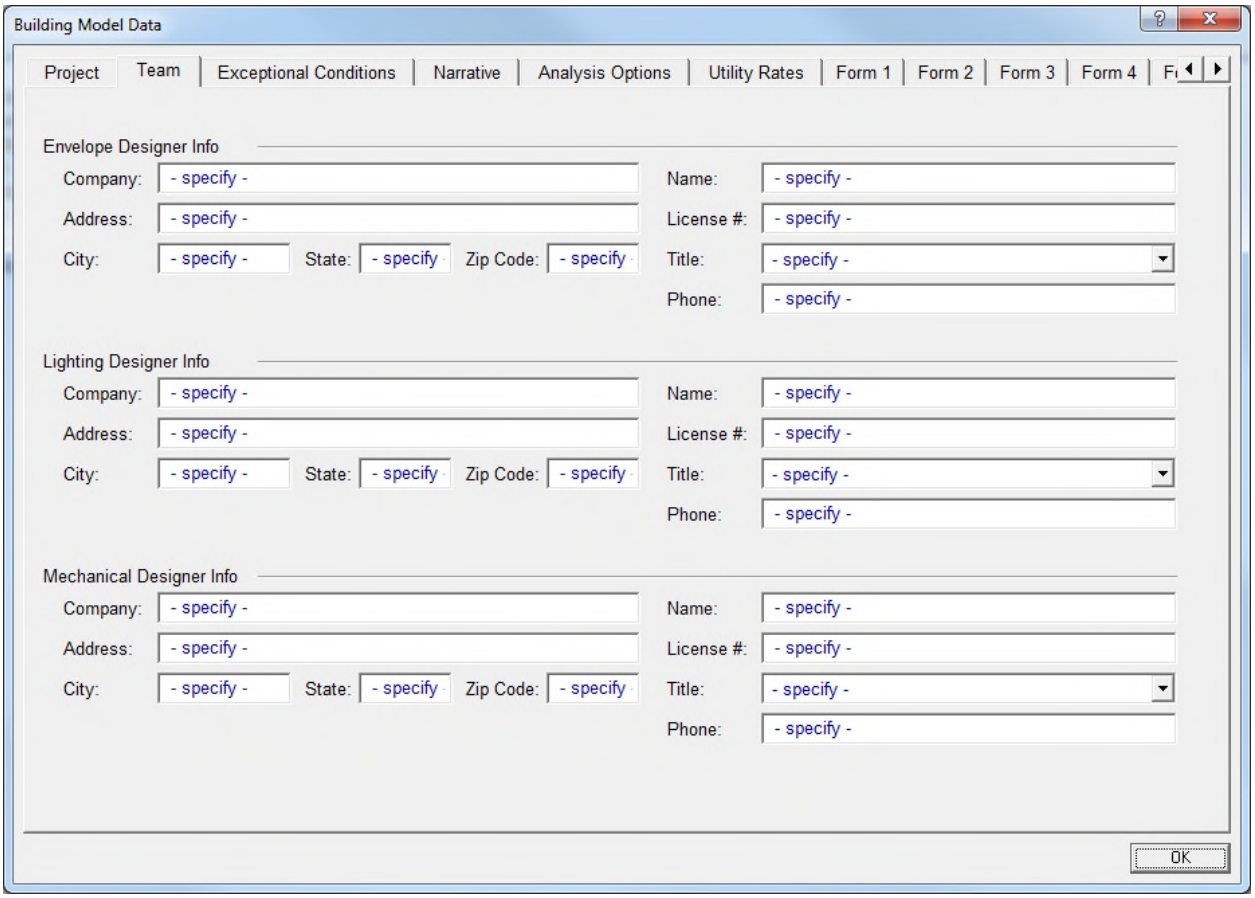
- **St. Address:** Street address where the project is located.
- **City**: City where the project is located.
- **State:** State where the project is located.
- **Zip Code**: ZIP code where the project is located. Location and Weather File date defaulted based on this value.
- **Climate Zone**: California climate zone (CTZ 1–16).
- **Weather Station:** California weather station.

File Management section

- **Creation**: The time and date of creation of the project file.
- **Last Mod**: The time and date of the last revision of the project file.
- **Last Run**: The time and date of the last analysis run of the project file.

Project Data Screen (Team Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Team** tab.


Building Model Data
Project
Team
Exceptional Conditions
Narrative
Analysis Options
Utility Rates
Form 1
Form 2
Form 3
Form 4
Envelope Designer Info
Company: - specify -
Address: - specify -
City: - specify - State: - specify - Zip Code: - specify -
Name: - specify -
License #: - specify -
Title: - specify -
Phone: - specify -
Lighting Designer Info
Company: - specify -
Address: - specify -
City: - specify - State: - specify - Zip Code: - specify -
Name: - specify -
License #: - specify -
Title: - specify -
Phone: - specify -
Mechanical Designer Info
Company: - specify -
Address: - specify -
City: - specify - State: - specify - Zip Code: - specify -
Name: - specify -
License #: - specify -
Title: - specify -
Phone: - specify -
OK

Input summary for the **Team** tab:

Envelope Designer Info section

- **Company**: Envelope designer's company (input is optional).
- **Name**: Envelope designer's primary contact name (input is optional).
- **Address**: Envelope designer's primary address (input is optional).
- **License:** Envelope designer's license (input is optional).
- **City:** Envelope designer's city (input is optional).
- **State:** Envelope designer's state (input is optional).
- **Zip Code:** Envelope designer's ZIP code (input is optional).
- **Title:** Envelope designer's title (input is optional)
- **Phone**: Envelope designer's primary contact phone (input is optional).

Lighting Designer Info section

- **Company**: Lighting designer's company (input is optional).
- **Name**: Lighting designer's primary contact name (input is optional).
- **Address**: Lighting designer's primary address (input is optional).
- **License**: Lighting designer's license (input is optional).
- **City**: Lighting designer's city (input is optional).

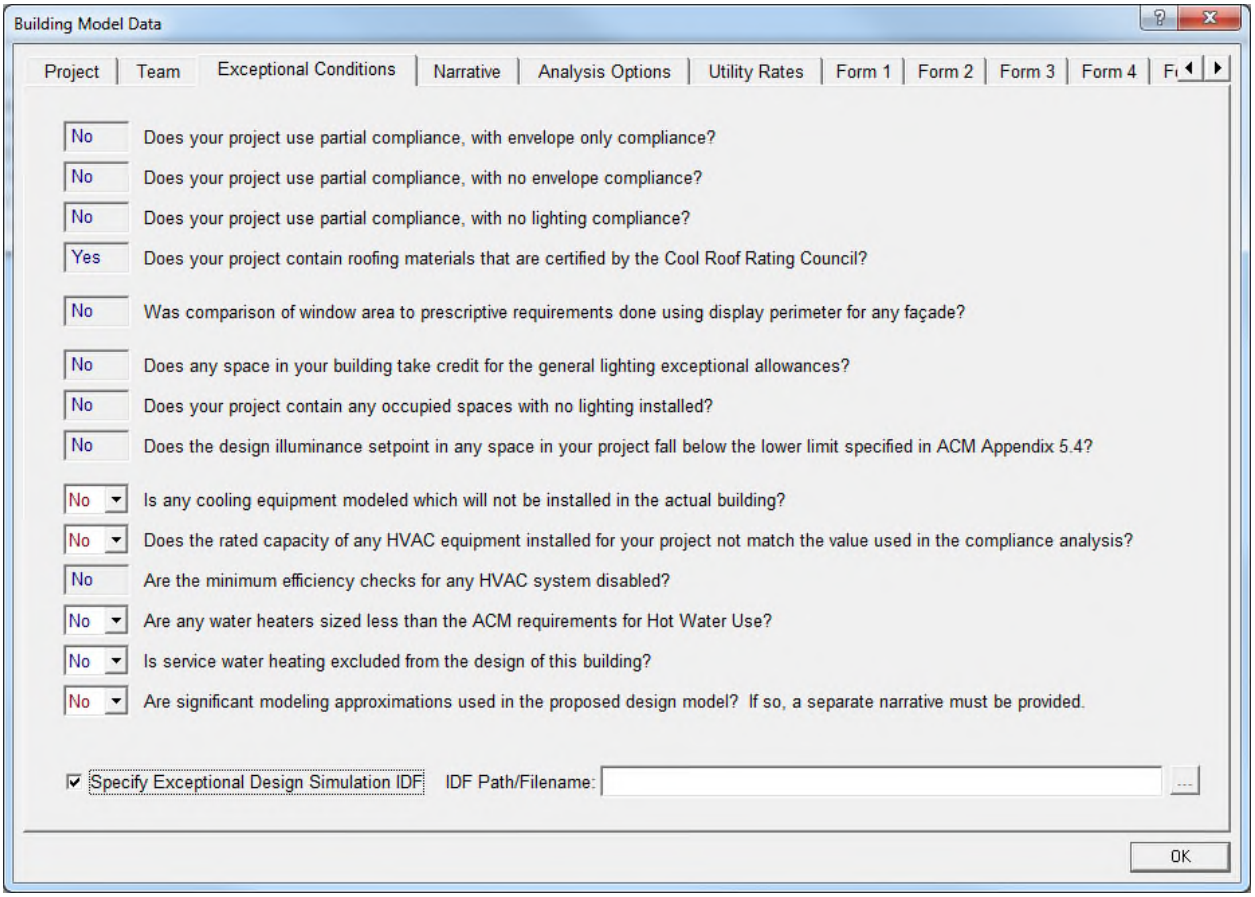
- **State**: Lighting designer's state (input is optional).
- **Zip Code**: Lighting designer's ZIP code (input is optional).
- **Title:** Lighting designer's title (input is optional)
- **Phone:** Lighting designer's primary contact phone (input is optional).

Mechanical Designer Info section

- **Company**: Mechanical designer's company (input is optional).
- **Name:** Mechanical designer's primary contact name (input is optional).
- **Address:** Mechanical designer's primary address (input is optional).
- **License**: Mechanical designer's license (input is optional).
- **City**: Mechanical designer's city (input is optional).
- **State**: Mechanical designer's state (input is optional).
- **Zip Code**: Mechanical designer's ZIP code (input is optional).
- **Title:** Mechanical designer's title (input is optional)
- **Phone**: Mechanical designer's primary contact phone (input is optional).

Project Data Screen (Exceptional Conditions Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Exceptional Conditions** tab.


Building Model Data
Project
Team
Exceptional Conditions
Narrative
Analysis Options
Utility Rates
Form 1
Form 2
Form 3
Form 4
No
Does your project use partial compliance, with envelope only compliance?
No
Does your project use partial compliance, with no envelope compliance?
No
Does your project use partial compliance, with no lighting compliance?
Yes
Does your project contain roofing materials that are certified by the Cool Roof Rating Council?
No
Was comparison of window area to prescriptive requirements done using display perimeter for any façade?
No
Does any space in your building take credit for the general lighting exceptional allowances?
No
Does your project contain any occupied spaces with no lighting installed?
No
Does the design illuminance setpoint in any space in your project fall below the lower limit specified in ACM Appendix 5.4?
No
Is any cooling equipment modeled which will not be installed in the actual building?
No
Does the rated capacity of any HVAC equipment installed for your project not match the value used in the compliance analysis?
No
Are the minimum efficiency checks for any HVAC system disabled?
No
Are any water heaters sized less than the ACM requirements for Hot Water Use?
No
Is service water heating excluded from the design of this building?
No
Are significant modeling approximations used in the proposed design model? If so, a separate narrative must be provided.
Specify Exceptional Design Simulation IDF
IDF Path/Filename:
OK

Input summary for the **Exceptional Conditions** tab:

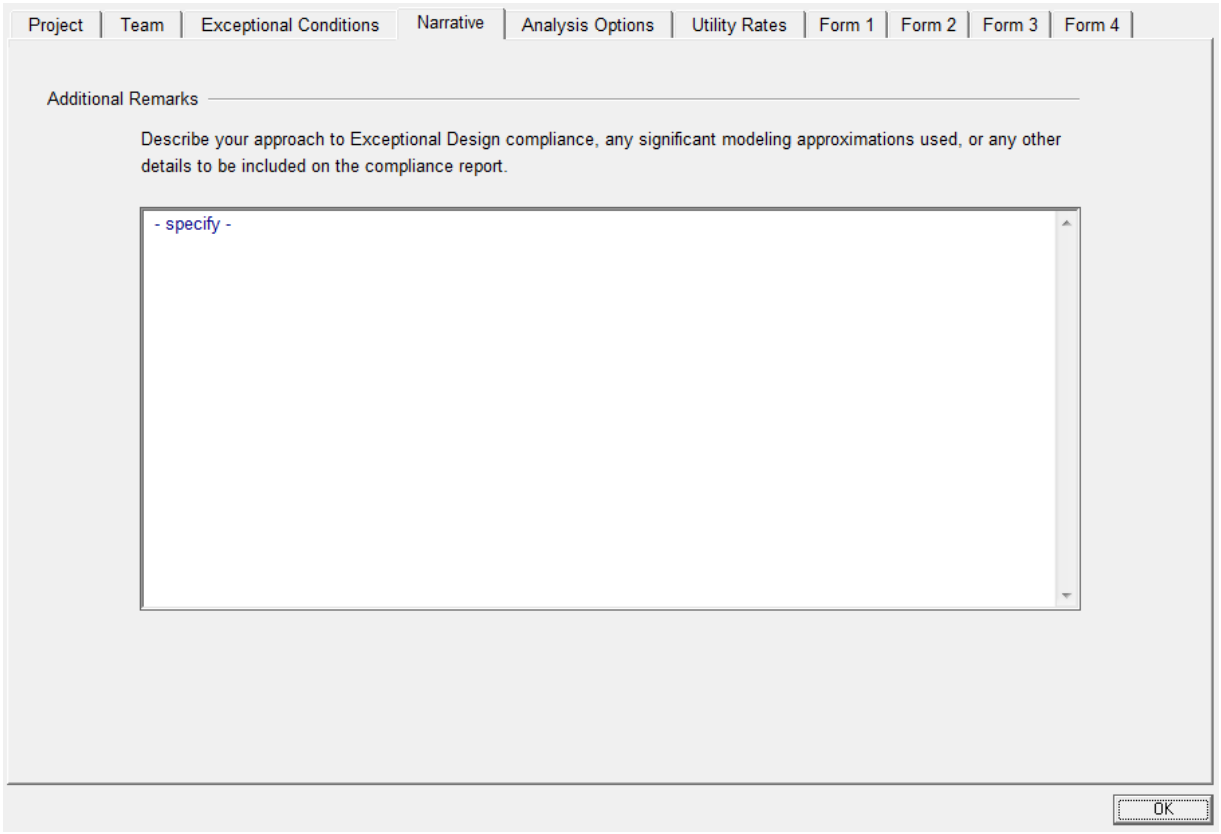
All of the options on this screen must be either **Yes** or **No** as appropriate.

If any of the exceptional conditions apply to your project, select **Yes**. The compliance forms will include guidance for the code reviewer to check the exceptional conditions for compliance.

- **Specify Exceptional Design Simulation IDF IDF Path/Filename**: When a building cannot be adequately modeled within CBECC, select a modified EnergyPlus IDF with all the capabilities available to EnergyPlus for CBECC to compare with the baseline.

Project Data Screen (Narrative Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Narrative** tab.

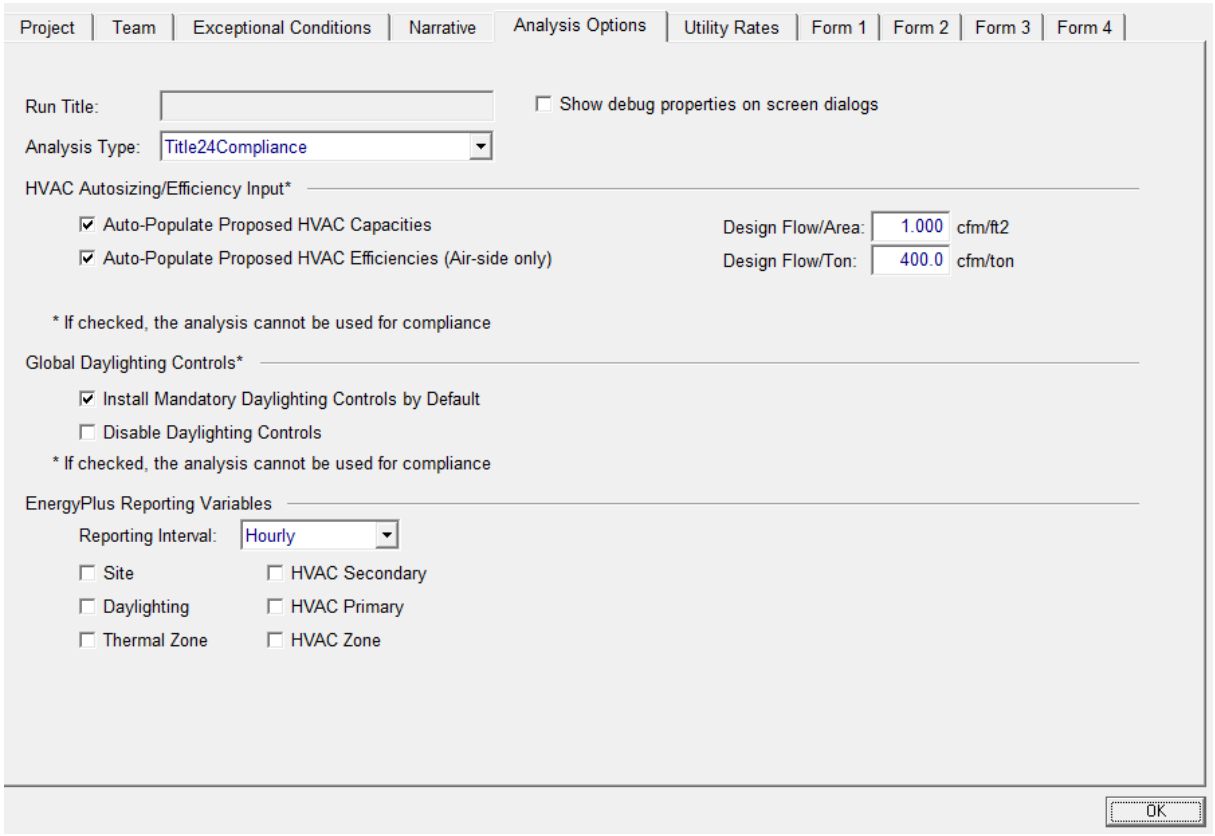


Input summary for the **Narrative** tab:

- **Additional Remarks**: A description of any exceptional modeling details or designs to be reviewed by the building department.

Project Data Screen (Analysis Options Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Analysis Options** tab. This tab provides inputs for use in building analysis other than compliance.



Input summary for the **Analysis Options** tab:

- **Run Title:** Title that appears on reports to identify this analysis.
- **Analysis Type:** Type of analysis to be performed.
- **Show debug properties on screen dialogs:** Check box for on screen dialogs.

HVAC Autosizing/Efficiency Input* section

- **Auto-Populate Proposed HVAC Capacities** (check box): For any HVAC component where the user has not specified a capacity value, the rules will calculate capacities based on the design flow/area and design flow/ton values below. Valid compliance analysis cannot be completed with this option checked; it is intended for use with other analysis objectives.
- **Auto-Populate Proposed HVAC Efficiencies (Air-side only)** (check box): For any HVAC component where the user has not specified an efficiency value, the rules will calculate an efficiency. Valid compliance analysis cannot be completed with this option checked; it is intended for use with other analysis objectives.
- **Design Flow/Area (cfm/ft2):** A ratio used to determine airflow capacity of HVAC components when **Auto-Populate Proposed HVAC Capacities** is checked.

- **Design Flow/Ton (cfm/ton):** A ratio used to determine cooling capacity of HVAC components when **Auto-Populate Proposed HVAC Capacities** is checked.

CBECC-Com requires that user model HVAC equipment have all capacity and efficiency inputs entered. For analysis that is not intended for compliance, these inputs may not be known. These inputs allow the user to activate rules of thumb to provide required equipment capacities, and to tailor these inputs if desired. However, if the two boxes are checked, the run results cannot be used to show compliance with the energy code.

Global Daylighting Controls* section

- **Install Mandatory Daylighting Controls by Default** (check box): Select to indicate the use of DefaultDayltgCtrls. (If checked, the analysis cannot be used for compliance.)
- **Disable Daylighting Controls** (check box): Select to disable the daylighting controls. (If checked, the analysis cannot be used for compliance.)

EnergyPlus Reporting Variables section

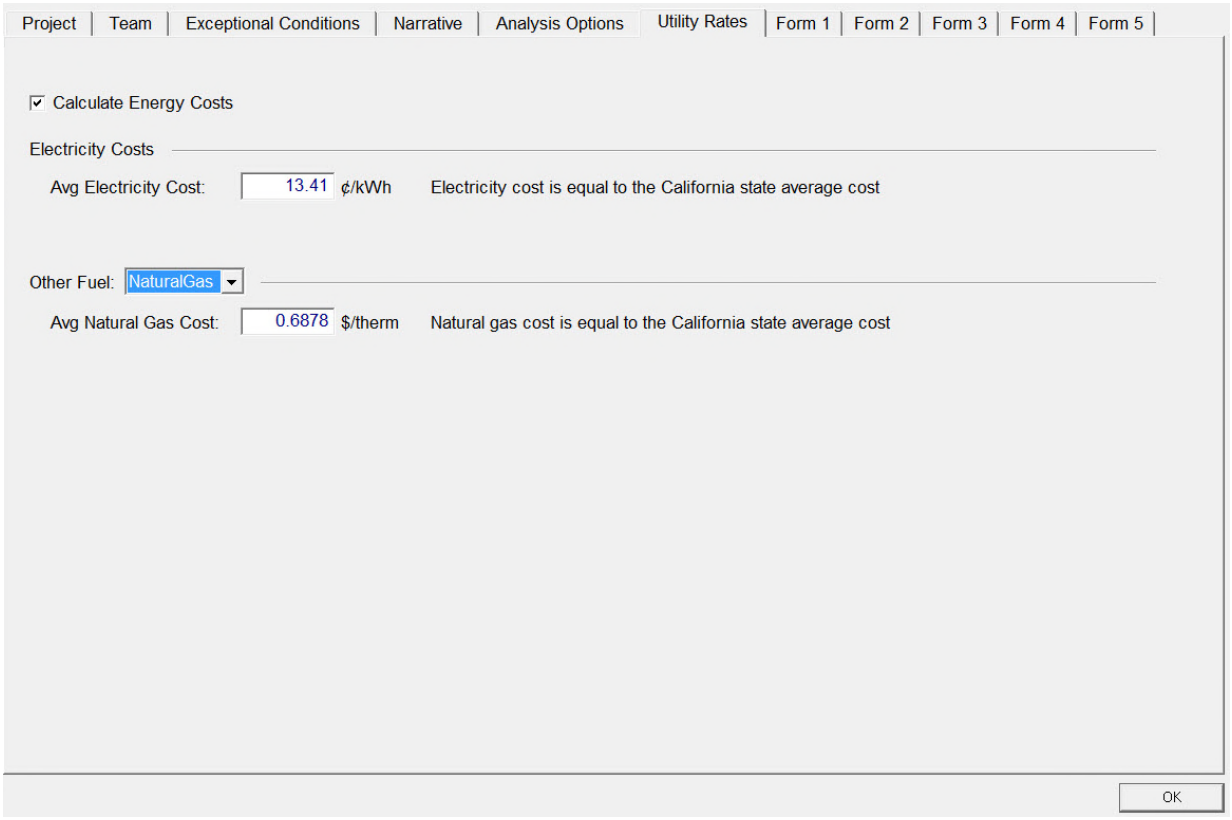
This section activates options to have EnergyPlus produce time series reports that are useful for model debugging or analysis.

- **Reporting Interval:** Options are RunPeriod, Monthly, Daily, Hourly, Timestep, and Detailed. This controls the frequency with which the selected data are reported in the output file.
- **Site** (check box): Select this option to cause a preselected set of variables related to the site, primarily weather data, to be included in the time series output.
- **Daylighting** (check box)**:** Select this option to turn on detailed EnergyPlus report variables for daylighting.
- **Thermal Zone** (check box): Select this option to cause a preselected set of variables related to thermal zones to be included in the time series output.
- **HVAC Secondary** (check box): Select this option to cause a preselected set of variables related to air systems to be included in the time series output.
- **HVAC Primary** (check box): Select this option to cause a preselected set of variables related to primary (central plant) systems to be included in the time series output.
- **HVAC Zone** (check box): Select this option to cause a preselected set of variables related to zone HVAC systems to be included in the time series output.

The **EnergyPlus Reporting Variables** check boxes activate writing of designated output variables to special report files. These output files are primarily intended for debugging of the rules and EnergyPlus translations, but may be useful for simulation debugging as well. These check boxes, unlike the previous ones on this tab, do not disqualify the run results from being used to show code compliance.

Project Data Screen (Utility Rates Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Utility Rates** tab.



Input summary for the **Utility Rates** tab:

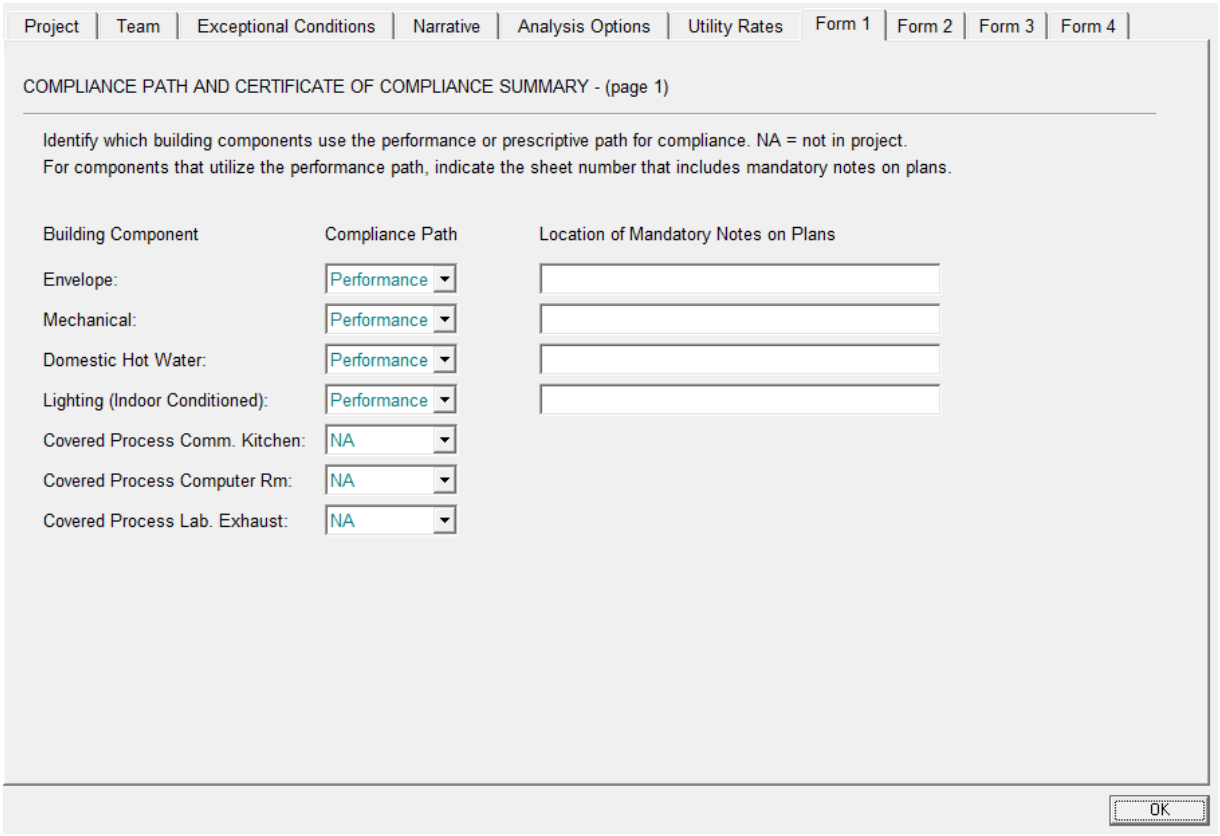
- **Calculate Energy Costs**: Select to indicate whether the energy cost calculations are to be performed (does not impact Title 24 Pass/Fail or compliance margins).

Electricity Costs section

- **Avg Electricity Cost:** The average electricity cost. (Input is optional.)
- **Other Fuel:** Select other fuel used on site if applicable. Options are none, NaturalGas, Propane, and FuelOil#2.

Project Data Screen (Form 1 Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Form 1** tab.

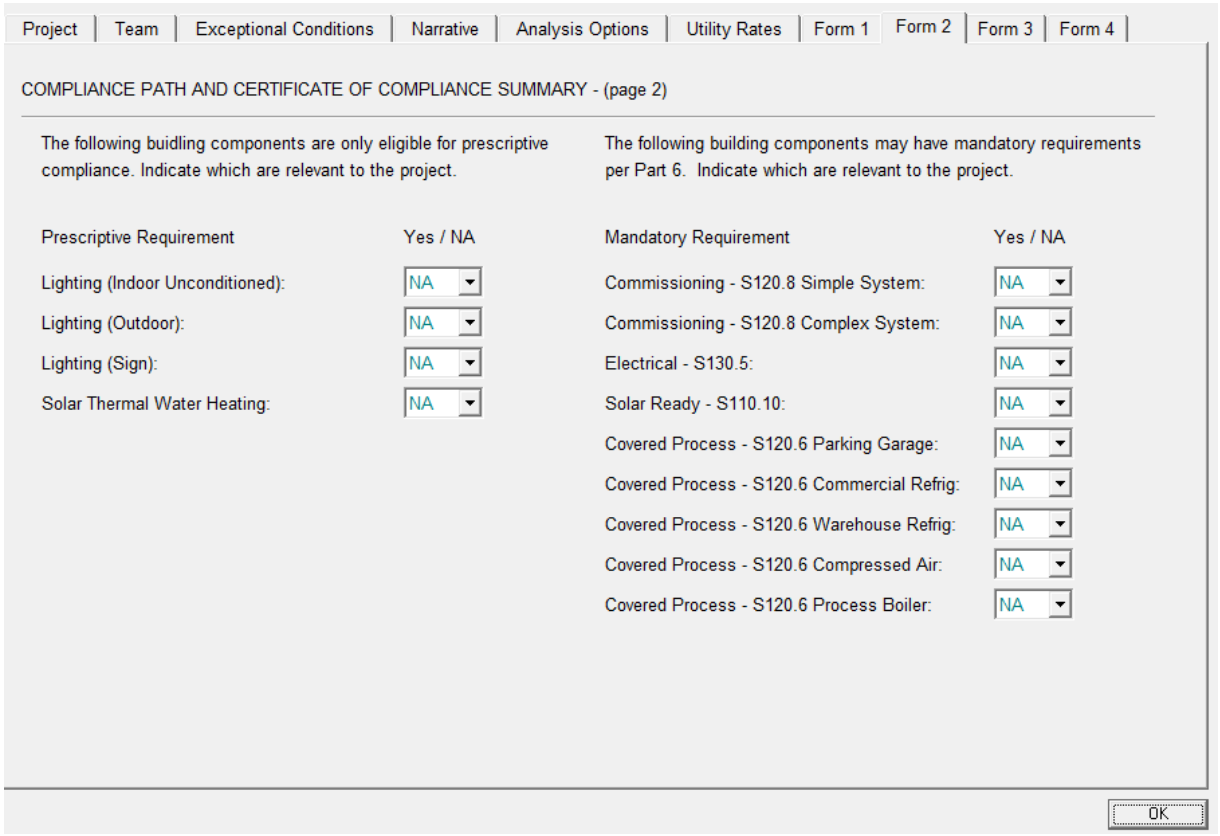


Input summary for the **Form 1** tab:

- **Compliance Path:** The choice of Performance, Prescriptive, or NA is available for each building component to move through compliance.
- **Location of Mandatory Notes on Plans:** Enter the location where the notes of the building component compliance path can be found.

Project Data Screen (Form 2 Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Form 2** tab.

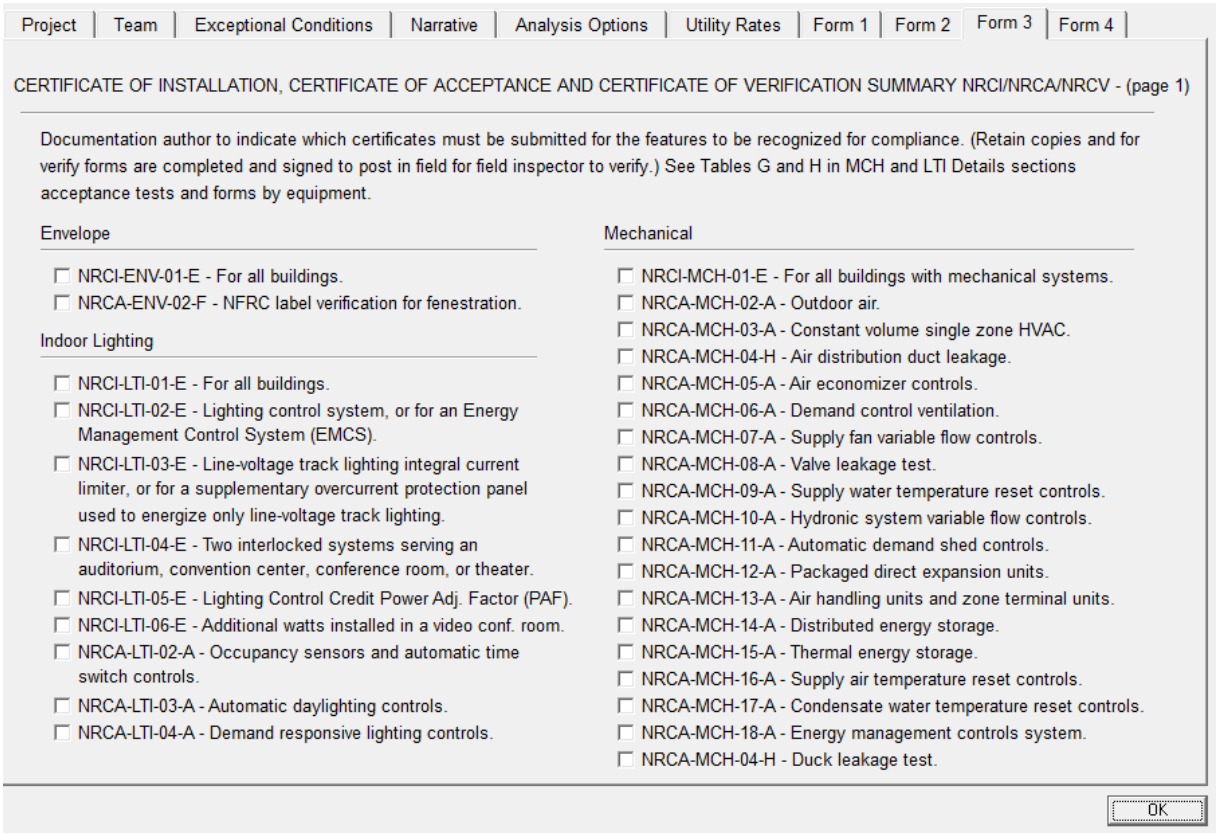

Project
Team
Exceptional Conditions
Narrative
Analysis Options
Utility Rates
Form 1
Form 2
Form 3
Form 4
COMPLIANCE PATH AND CERTIFICATE OF COMPLIANCE SUMMARY - (page 2)
The following buidling components are only eligible for prescriptive compliance. Indicate which are relevant to the project.
The following building components may have mandatory requirements per Part 6. Indicate which are relevant to the project.
Prescriptive Requirement
Yes / NA
Lighting (Indoor Unconditioned): NA
Lighting (Outdoor): NA
Lighting (Sign): NA
Solar Thermal Water Heating: NA
Mandatory Requirement
Yes / NA
Commissioning - S120.8 Simple System: NA
Commissioning - S120.8 Complex System: NA
Electrical - S130.5: NA
Solar Ready - S110.10: NA
Covered Process - S120.6 Parking Garage: NA
Covered Process - S120.6 Commercial Refrig: NA
Covered Process - S120.6 Warehouse Refrig: NA
Covered Process - S120.6 Compressed Air: NA
Covered Process - S120.6 Process Boiler: NA
OK

Input summary for the **Form 2** tab:

- **Prescriptive Requirement:** Select Yes or NA for each prescriptive requirement.
- **Mandatory Requirement:** Select Yes or NA for each mandatory requirement.

Project Data Screen (Form 3 Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Form 3** tab.

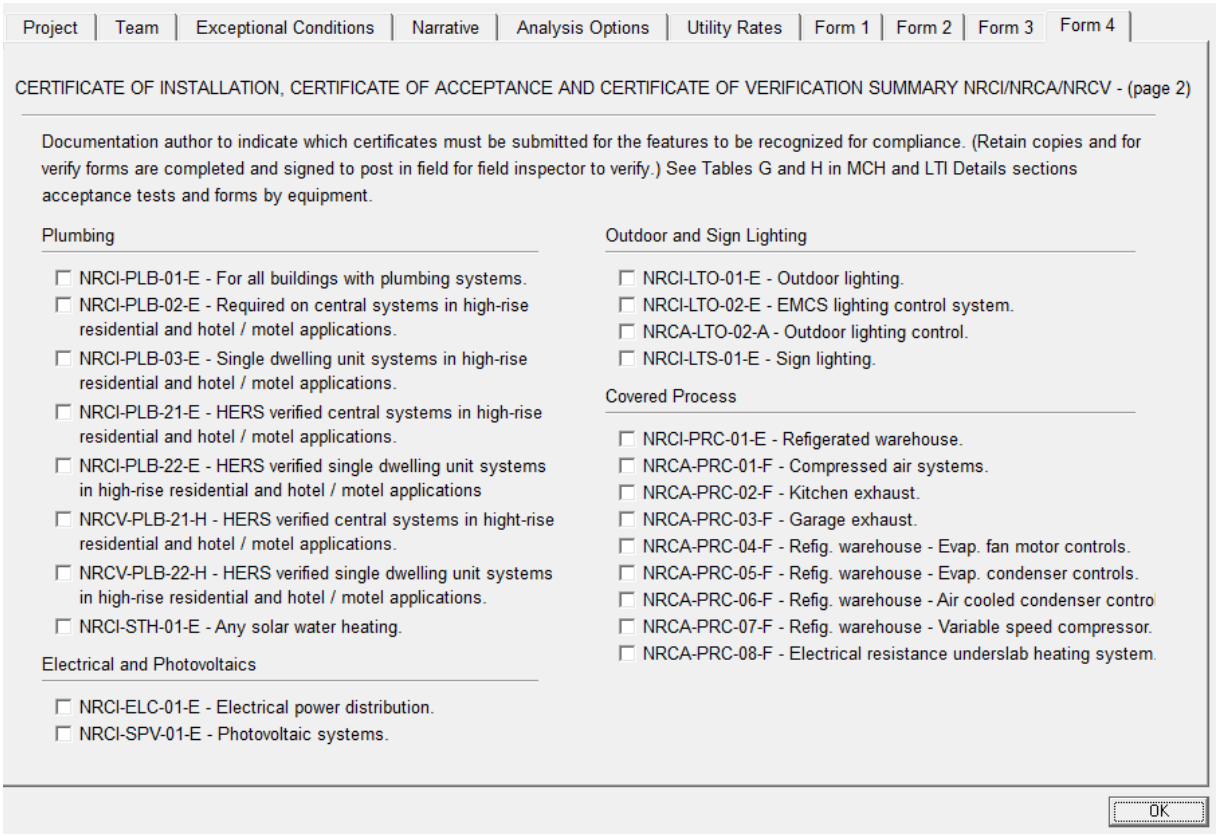

Project
Team
Exceptional Conditions
Narrative
Analysis Options
Utility Rates
Form 1
Form 2
Form 3
Form 4
CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE AND CERTIFICATE OF VERIFICATION SUMMARY NRCI/NRCA/NRCV - (page 1)
Documentation author to indicate which certificates must be submitted for the features to be recognized for compliance. (Retain copies and for verify forms are completed and signed to post in field for field inspector to verify.) See Tables G and H in MCH and LTI Details sections acceptance tests and forms by equipment.
Envelope
NRCI-ENV-01-E - For all buildings.
NRCA-ENV-02-F - NFRC label verification for fenestration.
Indoor Lighting
NRCI-LTI-01-E - For all buildings.
NRCI-LTI-02-E - Lighting control system, or for an Energy Management Control System (EMCS).
NRCI-LTI-03-E - Line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting.
NRCI-LTI-04-E - Two interlocked systems serving an auditorium, convention center, conference room, or theater.
NRCI-LTI-05-E - Lighting Control Credit Power Adj. Factor (PAF).
NRCI-LTI-06-E - Additional watts installed in a video conf. room.
NRCA-LTI-02-A - Occupancy sensors and automatic time switch controls.
NRCA-LTI-03-A - Automatic daylighting controls.
NRCA-LTI-04-A - Demand responsive lighting controls.
Mechanical
NRCI-MCH-01-E - For all buildings with mechanical systems.
NRCA-MCH-02-A - Outdoor air.
NRCA-MCH-03-A - Constant volume single zone HVAC.
NRCA-MCH-04-H - Air distribution duct leakage.
NRCA-MCH-05-A - Air economizer controls.
NRCA-MCH-06-A - Demand control ventilation.
NRCA-MCH-07-A - Supply fan variable flow controls.
NRCA-MCH-08-A - Valve leakage test.
NRCA-MCH-09-A - Supply water temperature reset controls.
NRCA-MCH-10-A - Hydronic system variable flow controls.
NRCA-MCH-11-A - Automatic demand shed controls.
NRCA-MCH-12-A - Packaged direct expansion units.
NRCA-MCH-13-A - Air handling units and zone terminal units.
NRCA-MCH-14-A - Distributed energy storage.
NRCA-MCH-15-A - Thermal energy storage.
NRCA-MCH-16-A - Supply air temperature reset controls.
NRCA-MCH-17-A - Condensate water temperature reset controls.
NRCA-MCH-18-A - Energy management controls system.
NRCA-MCH-04-H - Duck leakage test.
OK

Input summary for the **Form 3** tab:

- **Certificates of Installation:** Select the forms (certificate installation, certificate of acceptance and certificate of verification summary forms) that must be submitted for the features to be recognized for compliance.

Project Data Screen (Form 4 Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Form 4** tab.

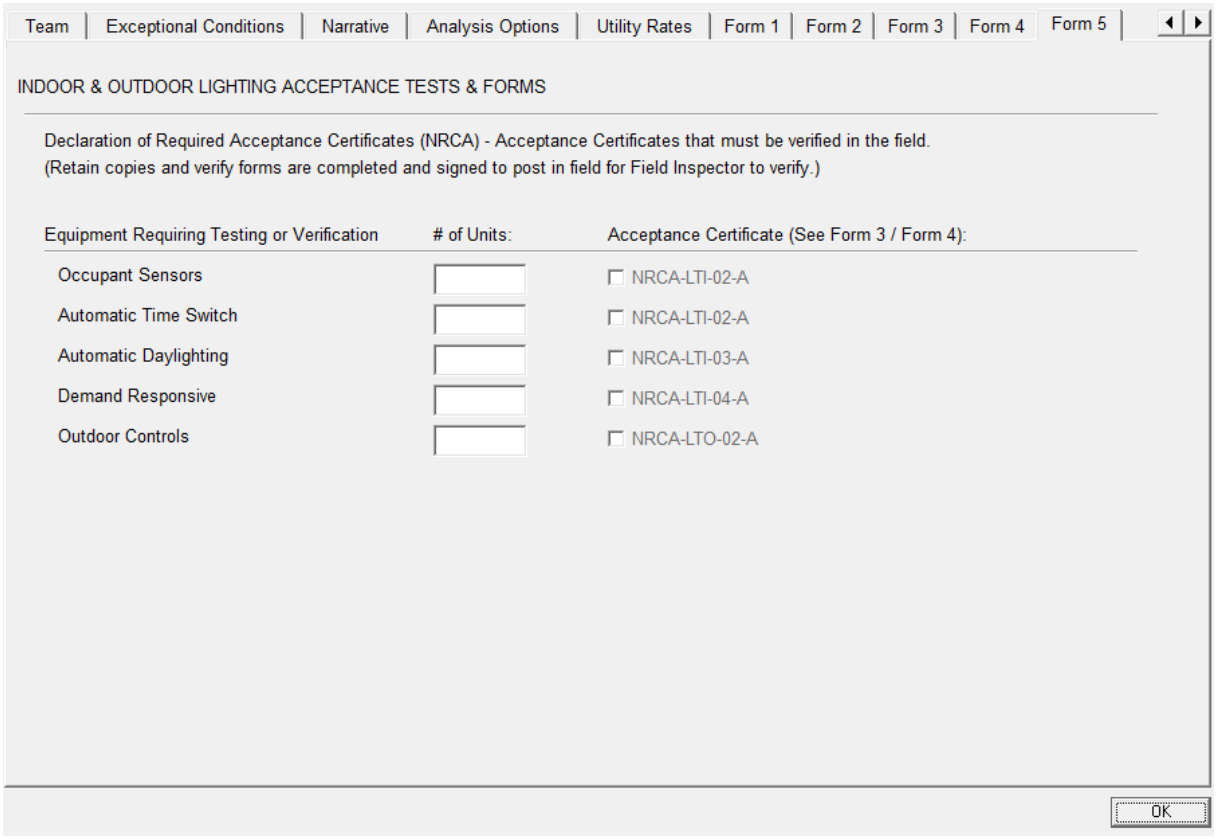

Project
Team
Exceptional Conditions
Narrative
Analysis Options
Utility Rates
Form 1
Form 2
Form 3
Form 4
CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE AND CERTIFICATE OF VERIFICATION SUMMARY NRCI/NRCA/NRCV - (page 2)
Documentation author to indicate which certificates must be submitted for the features to be recognized for compliance. (Retain copies and for verify forms are completed and signed to post in field for field inspector to verify.) See Tables G and H in MCH and LTI Details sections acceptance tests and forms by equipment.
Plumbing
NRCI-PLB-01-E - For all buildings with plumbing systems.
NRCI-PLB-02-E - Required on central systems in high-rise residential and hotel / motel applications.
NRCI-PLB-03-E - Single dwelling unit systems in high-rise residential and hotel / motel applications.
NRCI-PLB-21-E - HERS verified central systems in high-rise residential and hotel / motel applications.
NRCI-PLB-22-E - HERS verified single dwelling unit systems in high-rise residential and hotel / motel applications
NRCV-PLB-21-H - HERS verified central systems in hight-rise residential and hotel / motel applications.
NRCV-PLB-22-H - HERS verified single dwelling unit systems in high-rise residential and hotel / motel applications.
NRCI-STH-01-E - Any solar water heating.
Electrical and Photovoltaics
NRCI-ELC-01-E - Electrical power distribution.
NRCI-SPV-01-E - Photovoltaic systems.
Outdoor and Sign Lighting
NRCI-LTO-01-E - Outdoor lighting.
NRCI-LTO-02-E - EMCS lighting control system.
NRCA-LTO-02-A - Outdoor lighting control.
NRCI-LTS-01-E - Sign lighting.
Covered Process
NRCI-PRC-01-E - Refigerated warehouse.
NRCA-PRC-01-F - Compressed air systems.
NRCA-PRC-02-F - Kitchen exhaust.
NRCA-PRC-03-F - Garage exhaust.
NRCA-PRC-04-F - Refig. warehouse - Evap. fan motor controls.
NRCA-PRC-05-F - Refig. warehouse - Evap. condenser controls.
NRCA-PRC-06-F - Refig. warehouse - Air cooled condenser contro
NRCA-PRC-07-F - Refig. warehouse - Variable speed compressor.
NRCA-PRC-08-F - Electrical resistance underslab heating system.
OK

Input summary for the **Form 4** tab:

- **Certificates of Installation:** Select the forms (certificate installation, certificate of acceptance and certificate of verification summary forms that must be submitted for the features to be recognized for compliance.

Project Data Screen (Form 5 Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Form 5** tab.

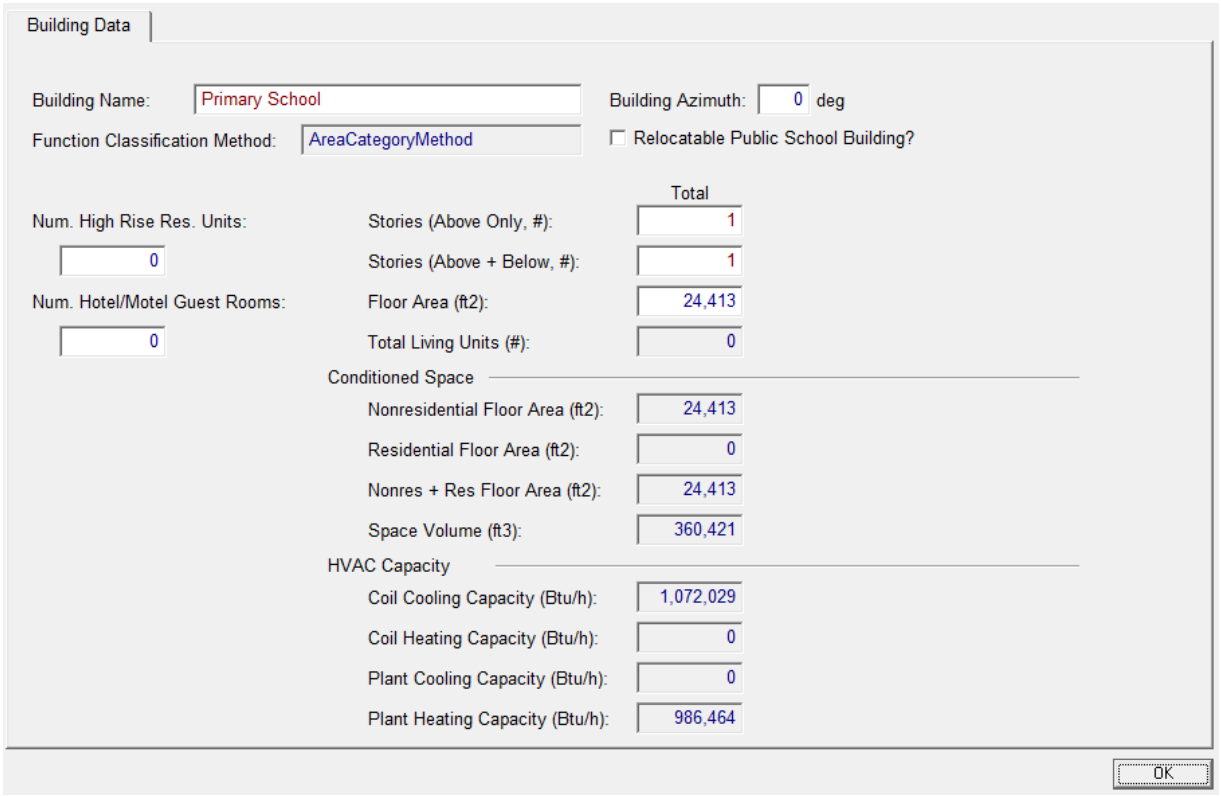


Input summary for the **Form 5** tab:

- **Equipment Requiring Testing or Verification:** Specify the number of units for each type of control requiring testing or verification.
- **Acceptance Certificate (See Form 3 / Form 4):** Forms for certificate of installation, certificate of acceptance, and certificate of verification summary.

Building Data Screen

To access this screen, under the Project name double click on the **Building Data** (Building Data icon).



Input summary for the Building Data screen:

- **Building Name**: The name or description used to identify the building.
- **Building Azimuth:** A measure of the orientation of a planar surface.
- **Function Classification Method:** The method of specifying functional area types. Identifies whether functional area types will be assigned using the Complete Building Method (not implemented in CBECC-Com) or the Area Category Method. At least 80 percent of the building area is required to be of the selected occupancy.
- **Relocatable Public School Building?** (check box): If yes, check the box.
- **Num. High Rise Res. Units:** The total number of High Rise Residential units in the building.
- **Stories (Above Only, #):** The number of above-grade building stories. This property is one determining factor for the baseline HVAC system type. A “floor” is considered a “Habitable Story,” defined in the Standards as a story that is at least 50 percent above grade.
- **Stories (Above + Below, #):** The number of above- plus below-grade building stories.
- **Num. Hotel/Motel Guest Rooms:** The total number of Hotel/Motel units in the building.
- **Floor Area (ft2):** The total floor area (conditioned and unconditioned) of the building.
- **Total Living Units (#):** The total number of residential or hotel/motel living units in the building.

Conditioned Space section

- **Nonresidential Floor Area (ft2)**: The total building nonresidential (conditioned) floor area.

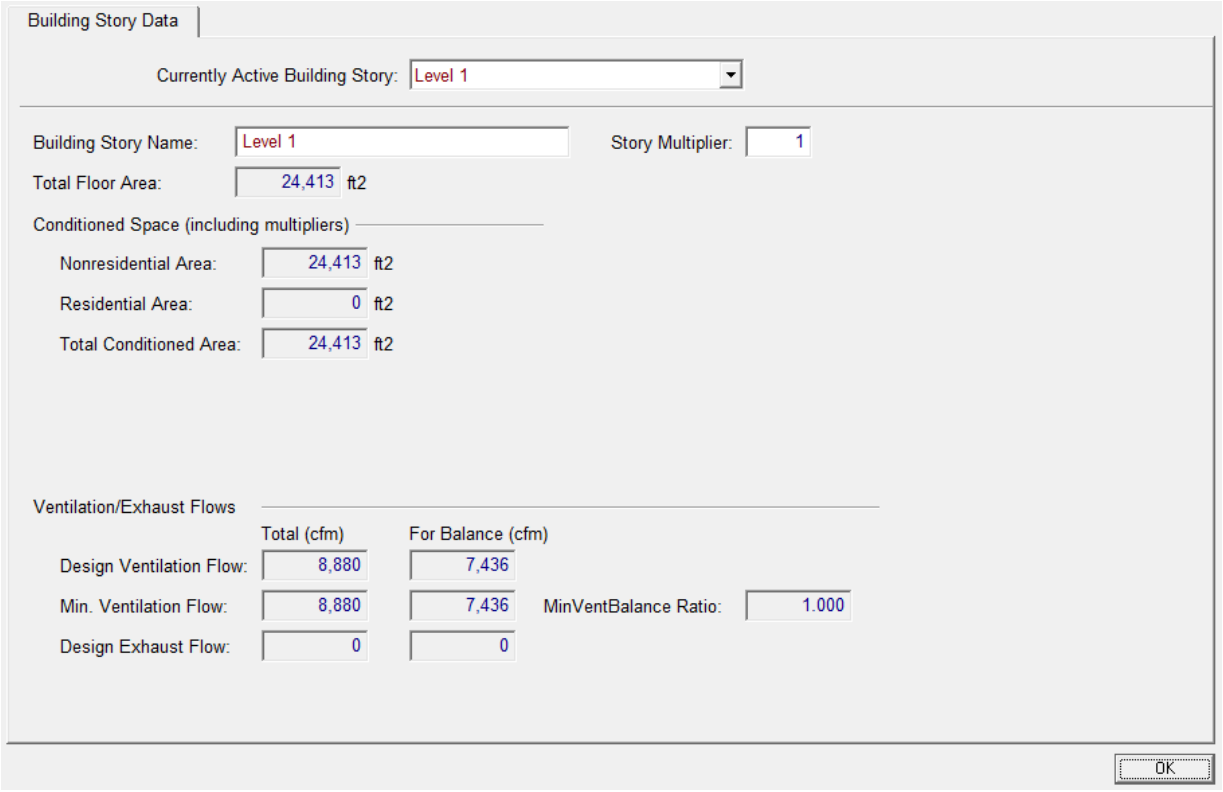
- **Residential Floor Area (ft2):** The total building residential (conditioned) floor area.
- **Nonres + Res Floor Area (ft2):** The total building nonresidential (conditioned) and residential (conditioned) floor area.
- **Space Volume (ft3):** The total building space (conditioned) volume.

HVAC Capacity section

- **Coil Cooling Capacity (Btu/h):** Building coil cooling capacity in Btu/hour.
- **Coil Heating Capacity (Btu/h):** Building coil heating capacity in Btu/hour.
- **Plant Cooling Capacity (Btu/h):** Plant coil cooling capacity in Btu/hour.
- **Plant Heating Capacity (Btu/h):** Plant coil heating capacity in Btu/hour.

Building Story Data Screen

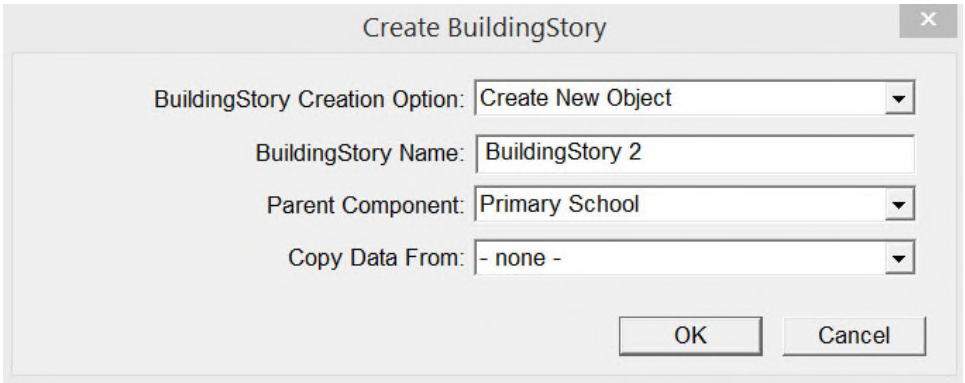
To access this screen, under Building Data double click on the **Building Story Data** (See Building Story icon).



Input summary for the Building Story data screen:

- **Currently Active Building Story:** The name of the currently selected building story.

  Note: If you select **Create New Building Story**, the Create Building Story dialog box appears. Make selections and click **OK.** The new building story is shown in the project tree.



- **Building Story Name**: The name or description used to identify the building story.
- **Story Multiplier**: Story multiplier. This property is user-specified for quickly multiplying the spaces and related thermal zones on each building floor.

- **Total Floor Area:** The total floor area (conditioned and unconditioned) of each story including multipliers.

Conditioned Space (including multipliers) section

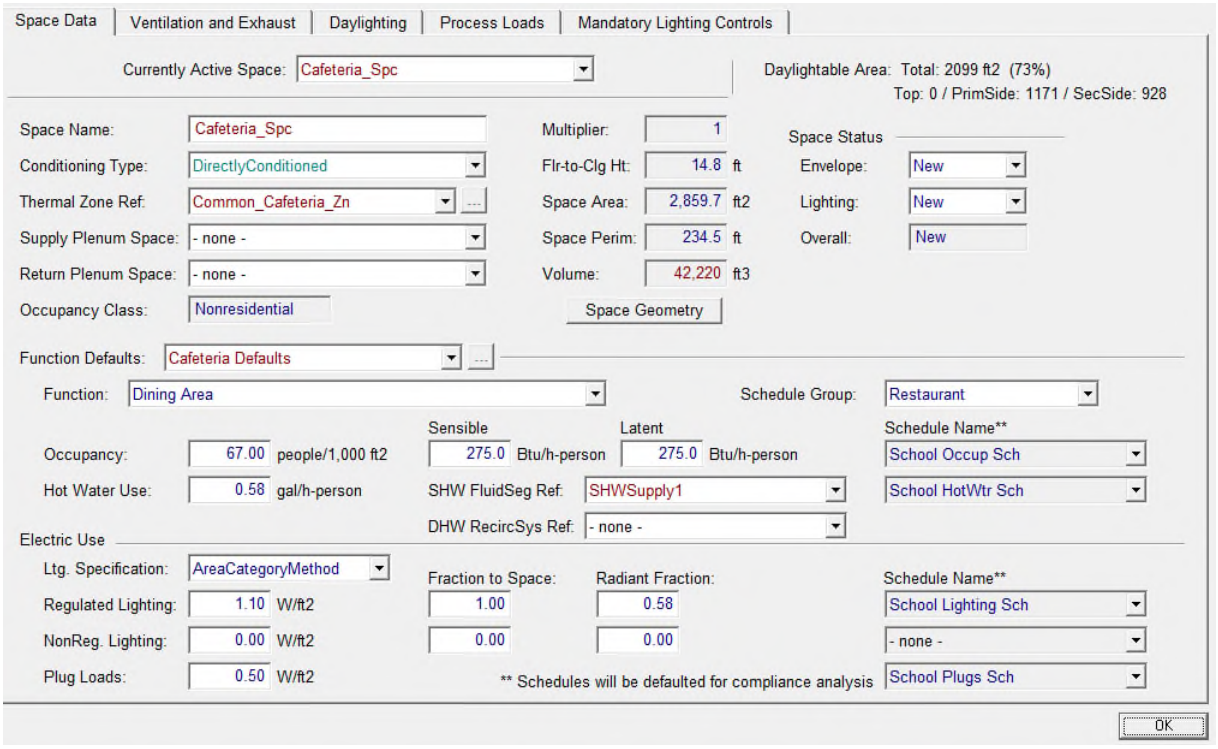
- **Nonresidential Area:** The total Story nonresidential (conditioned) floor area, including multipliers.
- **Residential Area:** The total Story residential (conditioned) floor area, including multipliers. This includes High Rise Residential and Hotel / Motel.
- **Total Conditioned Area:** The total Story (conditioned) floor area, including multipliers.

Ventilation/Exhaust Flows section

- **Design Ventilation Flow (Total [cfm]):** The quantity of ventilation air flow (per the proposed design) that is provided to the Building Story at design occupancy.
- **Design Ventilation Flow (For Balance [cfm]):** The quantity of ventilation air flow (per the proposed design) that is provided to the Building Story and included in the ventilation air flow balance.
- **Minimum Ventilation Flow (Total [cfm]):** The quantity of ventilation air flow (required per NACM rules) that is provided for the Building Story at design occupancy.
- **Minimum Ventilation Flow (For Balance [cfm]):** The quantity of ventilation air flow (required per NACM rules) that is provided for the Building Story and included in the ventilation air flow balance.
- **MinVentBalanceRatio:** The ratio of design ventilation air to the NACM required ventilation air for the Building Story.
- **Design Exhaust Flow (Total [cfm]):** The design exhaust air flow for the Building Story.
- **Design Exhaust Flow (For Balance [cfm]):** The design exhaust air flow for the Building Story included in the ventilation air flow balance.

Space Data Screen (Space Data Tab)

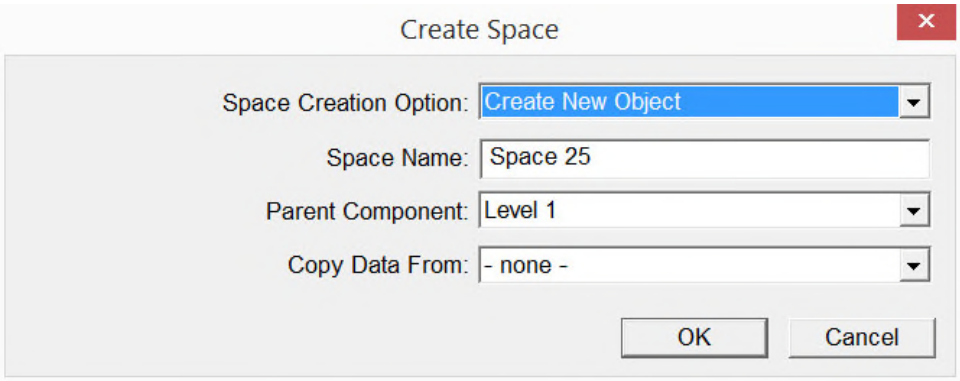
To access this screen, under Building Story Data double click **Space Data** (see Space Data icon).



Input summary for the Space data screen (**Space Data** tab):

- **Currently Active Space**: The name of the currently selected space.

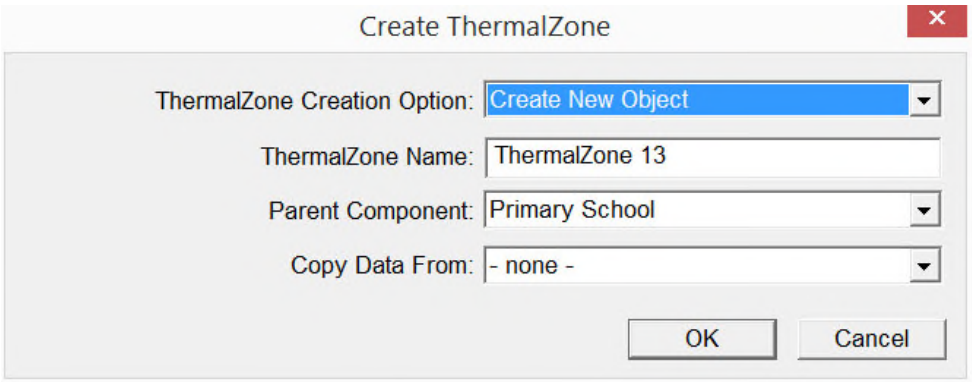
  Note: If you select **Create New Space**, the Create Space dialog box appears. Make selections and click **OK.** The Space Primary Data dialog box appears. Select the SpaceFunction and click **OK**. The new space is shown in user interface and the project tree.



- **Space Name**: The name or description used to identify the space.
- **Conditioning Type**: One of a list of categories that characterize the type of conditioning for a space.

- **Thermal Zone Ref:** Select the thermal zone that serves a given space, or create a new ThermalZone (and apply only here).

Note: If you select **Create ThermalZone**, the Create ThermalZone dialog box appears. Make selections and click **OK**. The Thermal Zone screen appears. See Thermal Zone Data screen below.



- **Supply Plenum Space:** The name of the supply air plenum space for the current Space.
- **Return Plenum Space:** The name of the return air plenum space for the current Space.
- **Occupancy Class:** The occupancy classification of the space.
- **Multiplier:** Space multiplier
- **Flr-to-Clg Ht:** The measurement of height from the top surface of the floor to the bottom surface of the ceiling. For spaces with sloped ceilings or floors, this is the nominal height, calculated from the space volume and floor area.
- **Space Area:** The floor area of any geometric space, including plenums, attics and other non-occupiable spaces.
- **Space Perim:** The perimeter of a space.
- **Volume:** Input the space volume (required input).

Space Status section

- **Envelope:** Specifies the Status of the envelope surfaces in a space for Additions, **Alterations**, and Partial Compliance. Options are New, Altered, and Existing.
- **Lighting:** Specifies the Status of the lighting in a space for Additions, Alterations, and Partial Compliance. Options are New, Altered, Existing, and Future.
- **Overall:** Specifies the Status of the space as determined by the Status of the specific child objects that impact HVAC energy use.

Function Defaults section

- **Function Defaults:** Select a unique SpaceFunctionDefaults object name.
- **Function:** The area category occupancy type from Nonresidential Appendix 5.4A.
- **Schedule Group:** The schedule group selection from Nonresidential Appendix 5.4A.
- **Occupancy:** The areal density of people associated with a space expressed in people per 1000 square feet.
- **Sensible:** The sensible heat of an occupant expressed in Btu per hour person.
- **Latent:** The latent heat of an occupant expressed in Btu per hour person.
- **Schedule Name** (Occupancy):** Reference to a unique occupant Schedule Name. (Schedules will be defaulted for compliance analysis.)

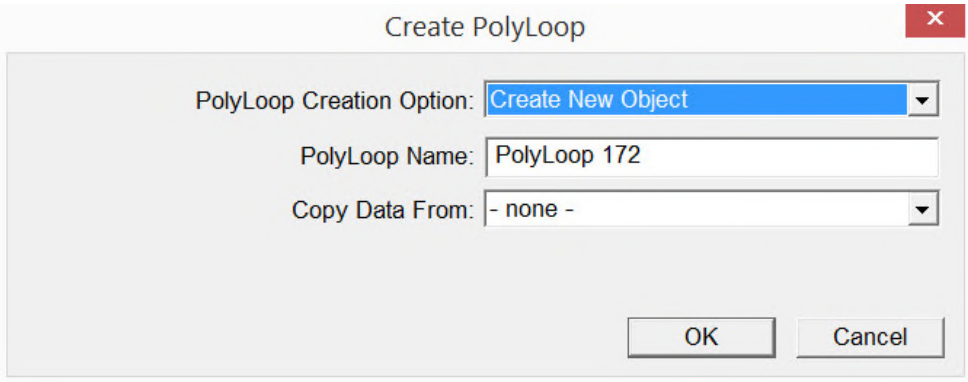
- **Hot Water Use (gal/h-person):** The amount of energy required to provide hot water for each person in a space during occupied hours.
- **SHW FluidSeg Ref:** Select the service hot water loop coming into the space, or create/import PrimarySupply FluidSegment (and apply only here). The Create FluidSegment dialog box appears. Make selections and click **OK**. The Fluid Segment Data tab then appears. Make selections and click **OK**. See the Fluid Segment Data Screen below.
- **Schedule Name** (Hot Water Use):** Reference to a unique hot water heating Schedule Name. (Schedules will be defaulted for compliance analysis.)
- **DHW RecircSys Ref:** Select the domestic hot water loop coming into the space, or create/import SecondarySupply FluidSegment (and apply only here). The Create RecirculationDHWSystem dialog box appears. Make selections and click **OK**. The Recirculation Water screen then appears. Make selections and click **OK**. See the Recirculation Water Heating System Data screen below.

Electric Use section

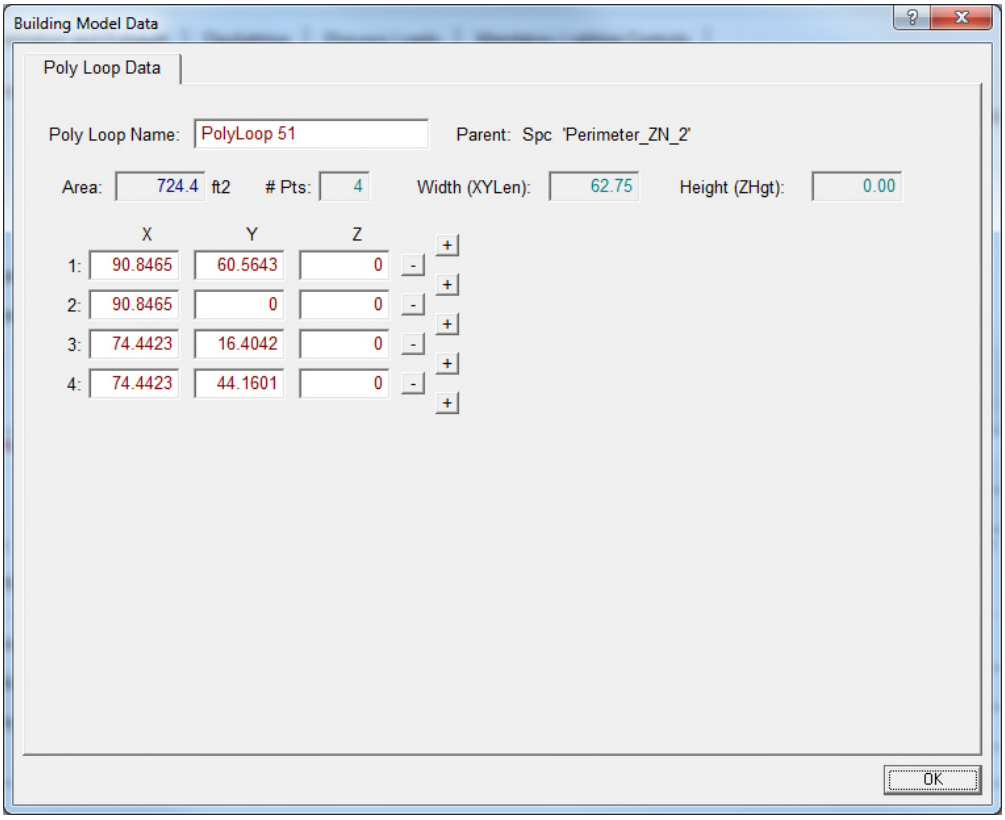
- **Ltg. Specification**: The method for selecting interior lighting and other loads.
- **Regulated Lighting (W/ft2):** Total regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Fraction to Space (Regulated Lighting):** Fraction of regulated interior lighting heat gain going to space air.
- **Radiant Fraction (Regulated Lighting)**: Fraction of regulated interior lighting radiant heat gain going to space surfaces.
- **NonReg. Lighting (W/ft2)**: Total non-regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Fraction to Space (NonReg. Lighting)**: Fraction of non-regulated interior lighting heat gain going to space air.
- **Radiant Fraction (NonReg. Lighting)**: Fraction of non-regulated interior lighting radiant heat gain going to space surfaces.
- **Plug Loads (W/ft2):** The usage of electrical devices plugged into receptacles in a space based on the occupancy type.
- **Schedule Name** (Regulated Lighting):** Reference to a schedule that describes a regulated interior lighting system. (Schedules will be defaulted for compliance analysis.)
- **Schedule Name** (Plug Loads):** Reference to a schedule that describes a nonregulated interior lighting system. (Schedules will be defaulted for compliance analysis.)
- **Schedules (Plug Loads):** Reference to a schedule that describes plug load use.

Space Geometry button

To access the space geometry, click this button (child Poly Loop object). The Create PolyLoop dialog box appears. Make selections and click **OK**.



The Poly Loop Data screen appears. Enter data and click **OK**.



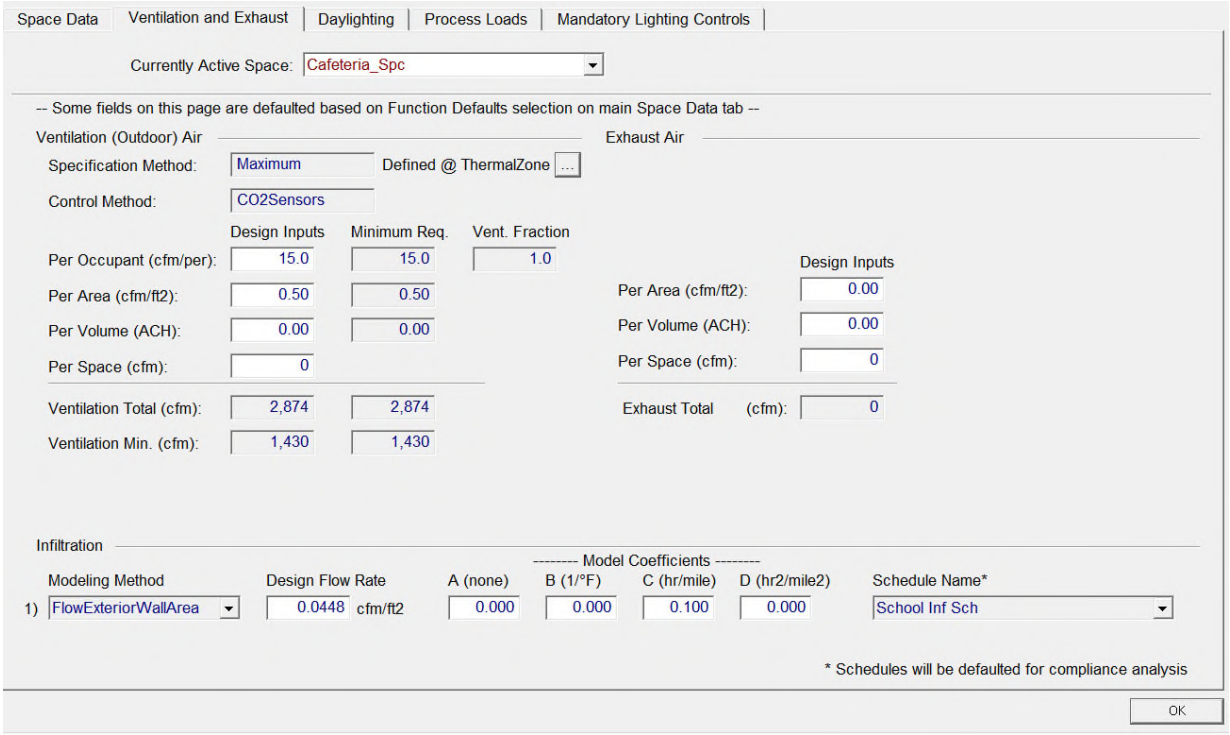
Input summary for the Poly Loop Data screen:

- **Poly Loop Name:** The name or description used to identify the Poly Loop.
- **Area:** Area of the Poly Loop.
- **# Pts:** The number of points.
- **Width (XYLen):** Width of the polygon calculated by the program based on the X/Y vertices..

- **Height (ZHgt):** Range of Z coordinates in the polyloop.
- **X:** The x coordinate of a poly loop vertex.
- **Y:** The y coordinate of a poly loop vertex.
- **Z:** The z coordinate of a poly loop vertex.

Space Data Screen (Ventilation and Exhaust Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Ventilation and Exhaust** tab.



Input summary for the Space Data screen (**Ventilation and Exhaust** tab):

- **Currently Active Space**: The name of the currently selected space.

Ventilation (Outdoor) Air section

- **Specification Method:** The method used to calculate the design ventilation flow for the ThermalZone.
- **Defined @ ThermalZone (button):** Click this button to access thermal zone data assigned to this space. The Thermal Zone Data screen appears. See Thermal Zone Data screen below.
- **Control Method:** The method used to vary the ventilation flow.
- **Per Occupant (cfm/per):** The user input outdoor air flow rate divided by the design or hourly occupancy of the space.
- **Per Area (cfm/ft2):** The user input outdoor air flow rate divided by the floor area of the space.
- **Per Volume (ACH):** The user input outdoor air flow rate in cubic feet per hour divided by the volume of the space.
- **Per Space (cfm):** The user input outdoor air flow rate in cubic feet per minute for the space.
- **Ventilation Total (cfm):** The quantity of ventilation air provided to the Space, based on the specification method defined at the ThermalZone.
- **Ventilation Min. (cfm):** The outside air flow rate of the Space for simulation.
- **Minimum Req.:** The code minimum quantity of ventilation air provided to the space.

- **Per Volume (ACH):** The code minimum amount of outside air provided to a space during occupied hours, divided by the volume of the space.
- **Per Area (cfm/ft2):** The code minimum amount of outside air provided to a space during occupied hours, divided by the floor area of that space.
- **Per Occupant (cfm):** The code minimum amount of outside air provided to a space during occupied hours, divided by the design number of people in the space.
- **Vent. Fraction:** The fraction of design occupancy that is assumed for calculating the minimum design ventilation rate for compliance analysis.

Exhaust Air section

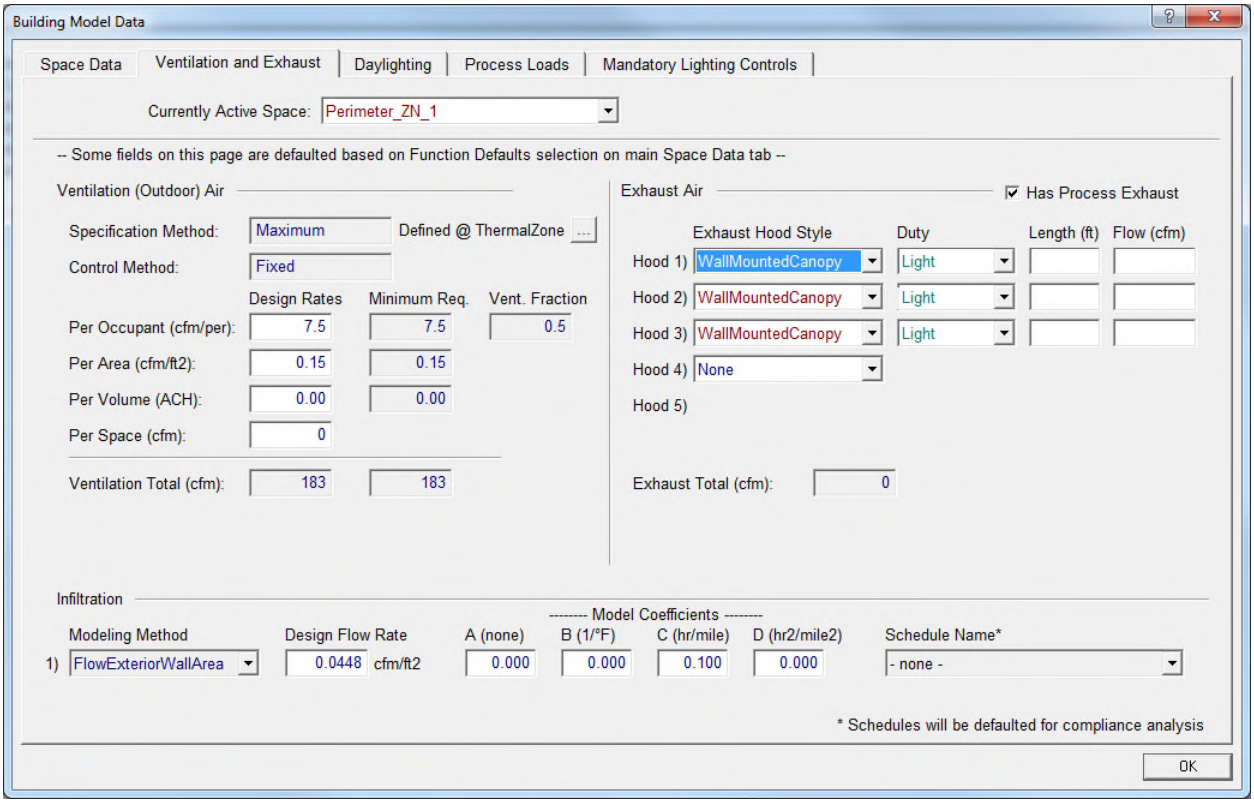
- **Per Area (cfm/ft2):** The design exhaust air flow rate in CFM/ft2 for the Space.
- **Per Volume (ACH):** The design exhaust air flow rate in ACH for the Space.
- **Per Space (cfm):** The design exhaust air flow rate in CFM for the Space.
- **Exhaust Total (cfm):** The design exhaust air flow rate in CFM for the Space.

Infiltration section

- **Modeling Method:** The method to model infiltration.
- **Design Flow Rate:** The quantity of air infiltrating the space in cfm/ft2.
- **Model Coefficients A (none):** The constant infiltration coefficient.
- **Model Coefficients B (1/°F):** The infiltration coefficient with units 1/°F.
- **Model Coefficients C (hr/mile):** The infiltration coefficient with units hr/mile.
- **Model Coefficients D (hr2/mile2):** The infiltration coefficient with units hr2/mile2.
- **Schedule Name*:** The user input schedule for infiltration modeling. (Schedules will be defaulted for compliance analysis.)

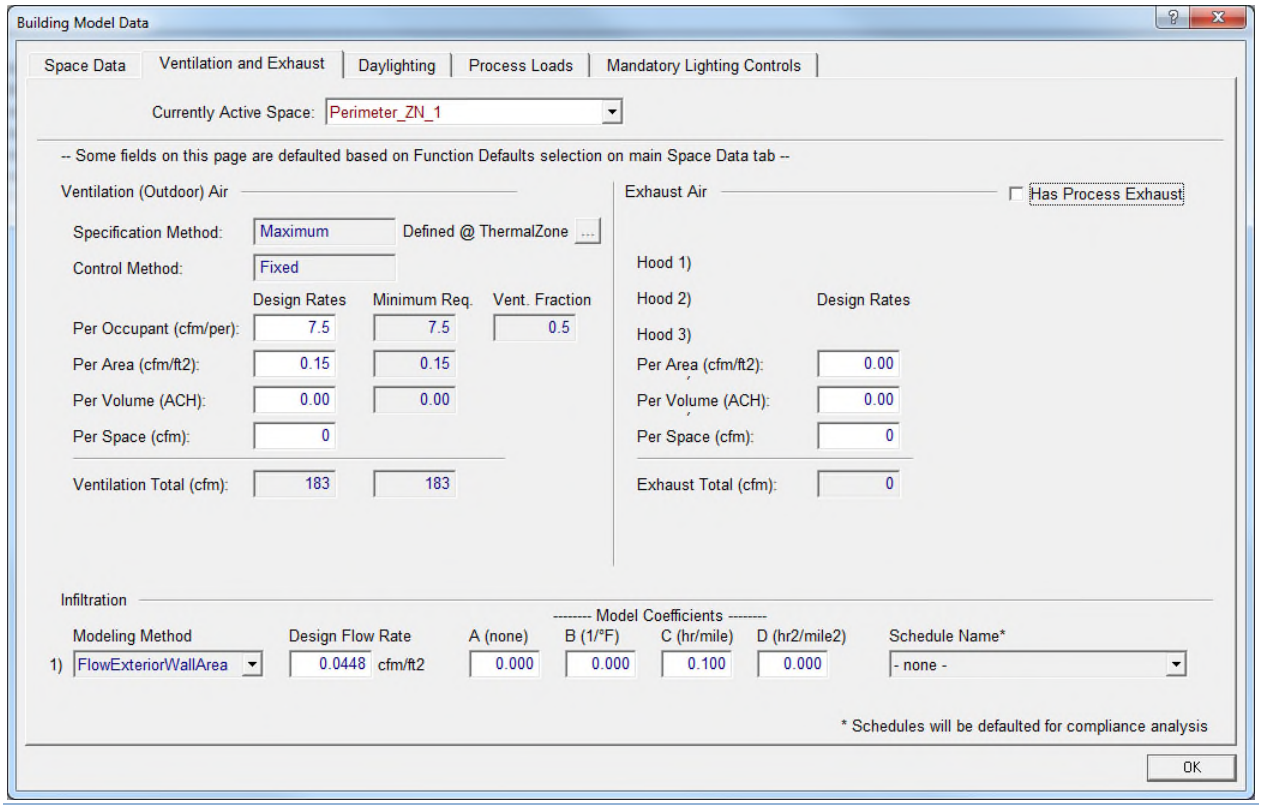
Space Data Screen (Ventilation and Exhaust Tab—Kitchen, Lab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Ventilation and Exhaust** tab. This screen is available only for spaces of function type **Kitchen** in the **Function** field of the **Space Data** tab.



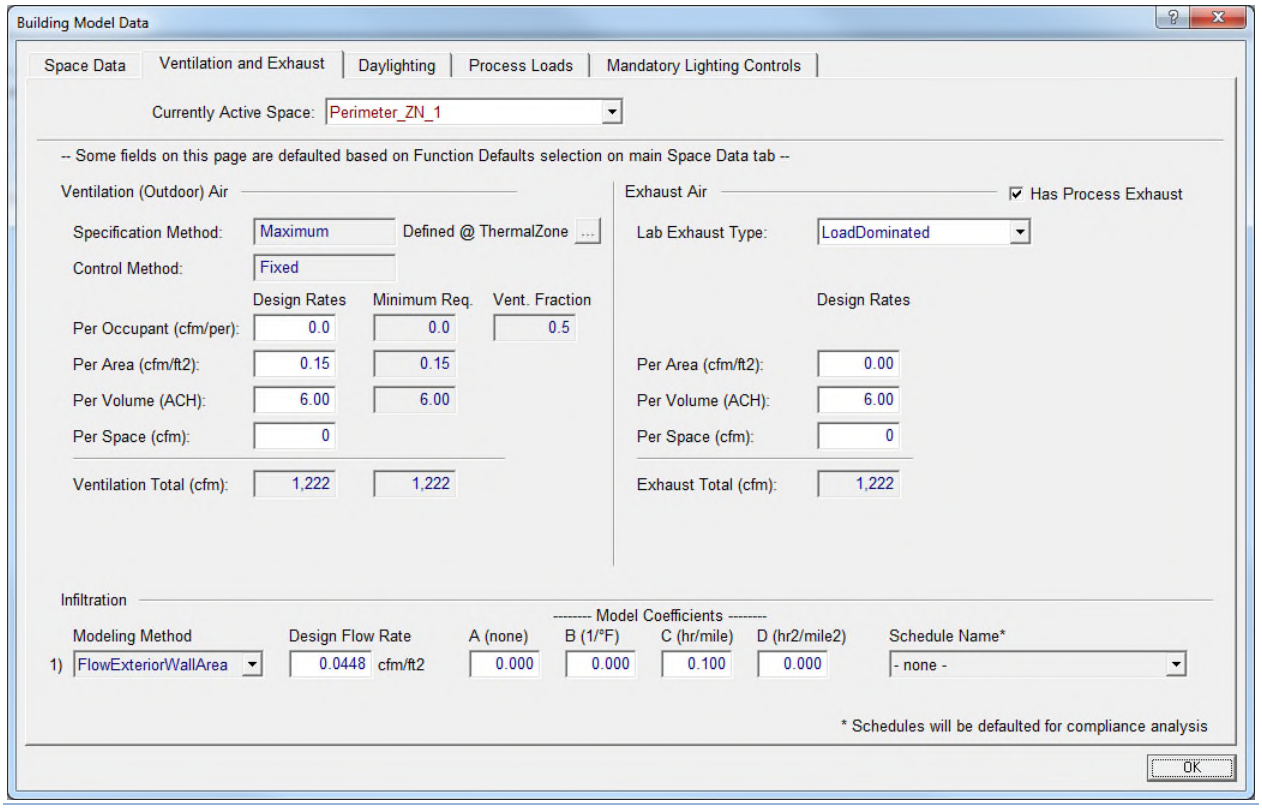
Exhaust Air section

- **Has Process Exhaust:** Kitchen Spaces that have mandatory requirement for Exhaust Fan's
- **Exhaust Hood Style:** Select the type of exhaust hood. Input is optional. Options are WallMountedCanopy, SingleIsland, DoubleIsland, Eyebrow, BackshelfOrPassover.
- **Duty:** Select the type of duty. Input is optional. Options are none, light, Medium, or Heavy.
- **Length (ft):** Enter length of hood in feet.
- **Flow (cfm):** The air flow rate in cfm.
- **Exhaust Total (cfm):** The design exhaust air flow rate in cfm for the Space.



Exhaust Air section (No Process Exhaust)

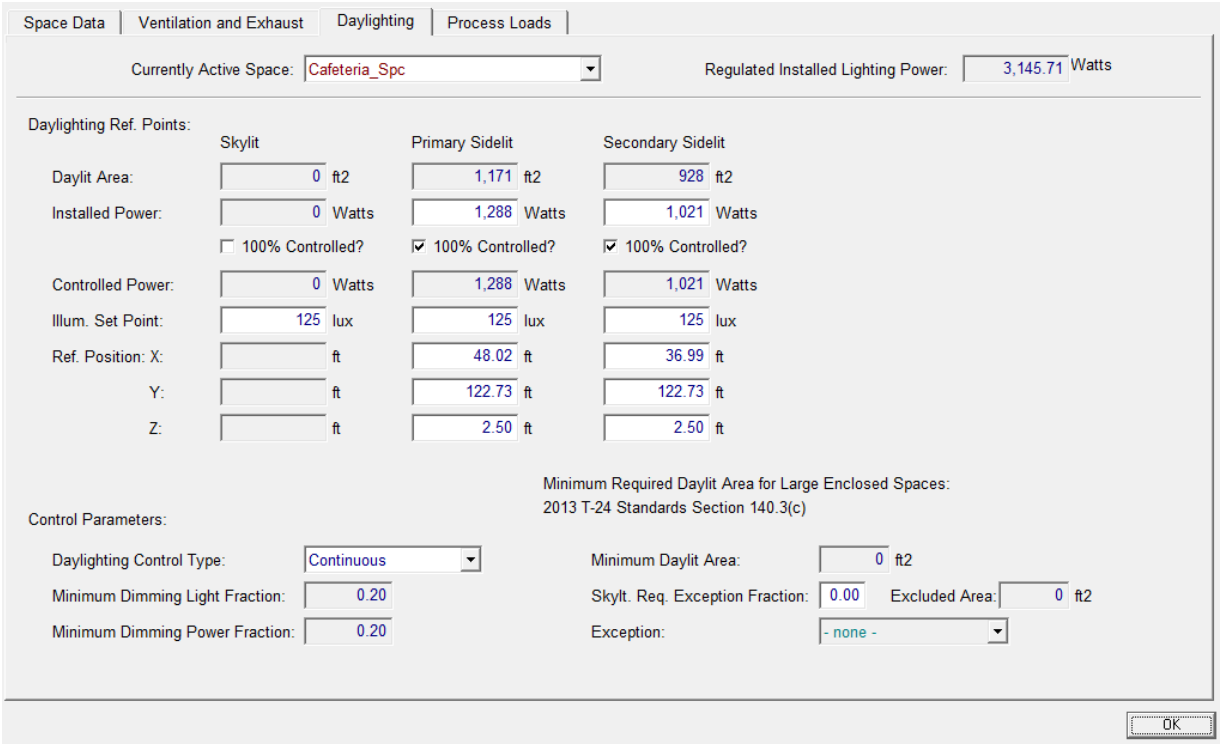
- **Per Area (cfm/ft2):** The design exhaust air flow rate in CFM/ft2 for the Space.
- **Per Volume (ACH):** The design exhaust air flow rate in ACH for the Space.
- **Per Space (cfm):** The design exhaust air flow rate in CFM for the Space.
- **Exhaust Total (cfm):** The design exhaust air flow rate in CFM for the Space.



For Spaces of type Laboratory with Process Exhaust choose Lab exhaust type. Options available are Load Dominated and Hood Dominated.

Space Data Screen (Daylighting Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Daylighting** tab.


Space Data
Ventilation and Exhaust
Daylighting
Process Loads
Currently Active Space: Cafeteria_Spc
Regulated Installed Lighting Power: 3,145.71 Watts
Daylighting Ref. Points:
Skylit
Primary Sidelit
Secondary Sidelit
Daylit Area: 0 ft2 1,171 ft2 928 ft2
Installed Power: 0 Watts 1,288 Watts 1,021 Watts
100% Controlled? 100% Controlled? 100% Controlled?
Controlled Power: 0 Watts 1,288 Watts 1,021 Watts
Illum. Set Point: 125 lux 125 lux 125 lux
Ref. Position: X: ft 48.02 ft 36.99 ft
Y: ft 122.73 ft 122.73 ft
Z: ft 2.50 ft 2.50 ft
Minimum Required Daylit Area for Large Enclosed Spaces:
2013 T-24 Standards Section 140.3(c)
Control Parameters:
Daylighting Control Type: Continuous
Minimum Daylit Area: 0 ft2
Minimum Dimming Light Fraction: 0.20
Skylt. Req. Exception Fraction: 0.00
Excluded Area: 0 ft2
Minimum Dimming Power Fraction: 0.20
Exception: - none -
OK

Input summary for the Space Data screen (**Daylighting** tab):

- **Currently Active Space**: The name of the currently selected space.
- **Regulated Installed Lighting Power (Watts):** This is a reference field which displays the current regulated installed lighting power for the currently active space.

Daylighting Ref. Points: Each daylit area type (Skylit, Primary Sidelit, and Secondary Sidelit) is automatically assigned a daylighting control position, which controls how the space lighting responds to the daylight illuminance measured at the control position. Each daylighting control position uses the following inputs:

- **Daylit Area (Skylit):** The skylit daylit area is the portion of the floor area that gets daylighting from a skylight or window. Skylit daylit area is defined as a band around the skylight well that has a depth equal to 70% of the ceiling height from the edge of the skylight well. The geometry of the skylit daylit area is the same as the geometry of the skylight.
- **Daylit Area (Primary Sidelit):** The primary sidelit daylit area is the portion of the floor area that gets the highest illumination from a window. Primary sidelit daylit area is defined as a band near the window with a depth equal to the distance from the floor to the top of the window and width equal to window width plus 0.5 times window head height wide on each side of the window opening.
- **Daylit Area (Secondary Sidelit):** The secondary sidelit daylit area is the portion of the floor area that gets less high, but still useful daylighting from a window. Secondary sidelit daylit area is defined as a band beyond the primary daylighted area that extends a distance double the distance from the floor to the top of the window and width equal to window width plus 0.5 times window head height wide on each side of the window opening.
- **Installed Power (Skylit):** The total lighting power of all luminaires located within the Skylit Daylit Zone. For spaces that use simplified lighting inputs (no interior lighting system), this

value is user editable. For spaces that use interior lighting systems, this value is calculated by CBECC-Com based on the Assigned Daylit Zone input located at the interior lighting system (IntLtgSys:DaylitAreaType).

- **Installed Power (Primary Sidelit):** The total lighting power of all luminaires located within the Primary Sidelit Daylit Zone.
- **Installed Power (Secondary Sidelit):** The total lighting power of all luminaires located within the Secondary Sidelit Daylit Zone.
- **100% Controlled (check box):** If checked, this indicates that 100% of the installed lighting power in Skylit, Primary Sidelit, or Secondary Sidelit Daylit Zone is controlled by the associated daylighting control position.
- **Controlled Power (Skylit):** The total power lighting located within the Skylit Daylit Zone that is controlled by daylight sensors.
- **Controlled Power (Primary Sidelit):** The total power of all luminaires within the Primary Sidelit Daylit Zone that is controlled by the associated daylighting control position. This field is only user editable when the associated daylit area is greater than zero, and 100% controlled is unchecked.
- **Controlled Power (Secondary Sidelit):** The total power of all luminaires within the Secondary Sidelit Daylit Zone that is controlled by the associated daylighting control position. This field is only user editable when the associated daylit area is greater than zero, and 100% controlled is unchecked.
- **Illum. Set Point (Skylit):** The illuminance setpoint for the skylit portion of the space in which the daylight control is located.
- **Illum. Set Point (Primary Sidelit):** The illuminance setpoint for the primary sidelit portion of the space in which the daylight control is located. Lighting controls are simulated so that the illuminance at the reference position is always maintained at, or above the illuminance setpoint.
- **Illum. Set Point (Secondary Sidelit):** The illuminance setpoint for the secondary sidelit portion of the space in which the daylight control is located. Lighting controls are simulated so that the illuminance at the reference position is always maintained at, or above the illuminance setpoint.
- **Ref. Position X (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position X (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position X (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Y (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Y (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.

- **Ref. Position Y (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.

Control Parameters Section

- **Daylighting Control Type:** Lighting controls are simulated so that the illuminance at the reference position is always maintained at or above the illuminance setpoint.
    - **None:** Lighting output and power are not modulated in response to predicted daylight illuminance.
    - **Continuous**: Continuous Dimming controls have a fraction to rated power to fraction of rated output that is a linear interpolation of the minimum power fraction at the minimum diming light fraction to rated power (power fraction = 1.0) at full light output.
    - **Continuous Plus Off:** Continuous Dimming + Off controls are the same as continuous dimming controls except that these controls can turn all the way off when none of the controlled light output is needed.
    - **Stepped Switching:** Stepped Switching Controls vary the electric input power and lighting output power in discrete equally spaced steps. See at each step, the fraction of light output is equal to the fraction of rated power.
- **Minimum Dimming Light Fraction:** The minimum light output of controlled lighting when fully dimmed. Minimum light fraction = (Minimum light output) / (Rated light output).
- **Minimum Dimming Power Fraction:** The minimum power fraction when controlled lighting is fully dimmed. Minimum power fraction = (Minimum power) / (Full rated power).
- **Number of Control Steps** (SteppedSwitching): The number of control steps. For step switching, identifies number of steps that require fraction of rated light output and rated power fraction.

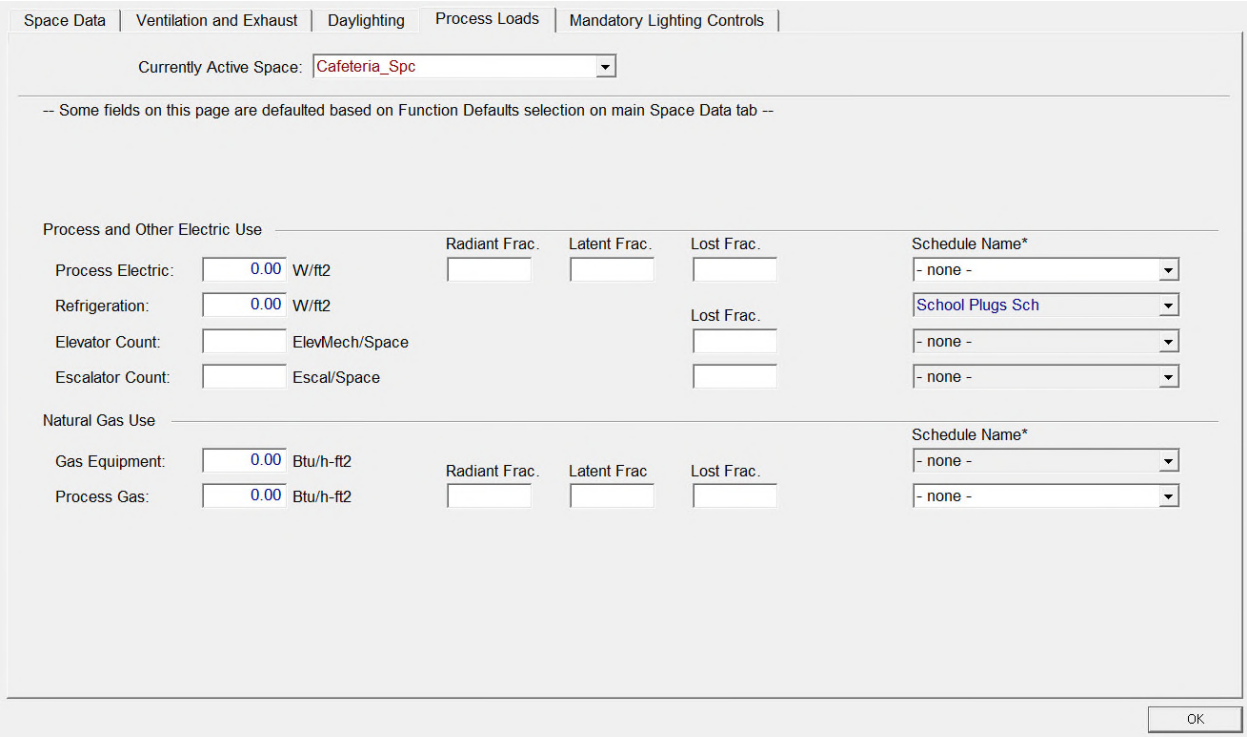
Minimum Required Daylit Area for Large Enclosed Spaces: 2013 T-24 Standards Section 140.3(c) Section

- **Minimum Daylit Area:** Area required to be daylit (Skylit plus Primary Sidelit) by Section 140.3c of Title 24 Standards.
- **Skylt. Req. Exception Fraction:** The fraction of floor area that is exempt from the Minimum Daylit Area requirement (2013 T-24 Standards Sec.140.3[c]).
- **Excluded Area:** Total area that is exempt from the skylight Minimum Daylit Area requirement.

- **Exception:** The specific exception to the Minimum Daylit Area requirement. Options are None, Auditorium, Church, MovieTheater, Museum, and RefigeratedWarehouse. Possible exceptions include:
  - The building is not located in climate zone 1 or climate zone 16 (automatically identified by CBECC software).
  - Designed general lighting is less than 0.5 W/ft2 (automatically identified by CBECC software).
  - Existing walls on plans result in enclosed spaces less than 5,000 ft2.
  - Future walls or ceilings on plans result in enclosed spaces less than 5,000 ft2 or ceiling heights less than 15 ft.
  - Plans or documents show that space is an auditorium, religious building of worship, movie theater, museum, or refrigerated warehouse.

Space Data Screen (Process Loads Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Process and Airflow** tab.


Space Data
Ventilation and Exhaust
Daylighting
Process Loads
Mandatory Lighting Controls
Currently Active Space: Cafeteria_Spc
-- Some fields on this page are defaulted based on Function Defaults selection on main Space Data tab --
Process and Other Electric Use
Radiant Frac.
Latent Frac.
Lost Frac.
Schedule Name*
Process Electric: 0.00 W/ft2 - none -
Refrigeration: 0.00 W/ft2 School Plugs Sch
Lost Frac.
Elevator Count: ElevMech/Space - none -
Escalator Count: Escal/Space - none -
Natural Gas Use
Schedule Name*
Gas Equipment: 0.00 Btu/h-ft2 - none -
Radiant Frac.
Latent Frac
Lost Frac.
Process Gas: 0.00 Btu/h-ft2 - none -
OK

Input summary for the **Process and Air Flow** tab:

- **Currently Active Space**: The name of the currently selected space.

Note: All fields on this page default based on the Function Defaults selection on main Space Data screen.

Process and Other Electric Use section

- **Process Electric:** Process load is the electric energy consumption in the conditioned space of a building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.
- **Process Electric (Radiant Frac.):** The fraction of radiant heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Electric (Latent Frac.):** The fraction of latent heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Electric (Lost Frac.):** The fraction of heat lost to the exterior is based on appliance energy use.
- **Schedule Name* (Process Electric):** The use of process electric represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area

Category Method or Complete Building Method (not implemented in CBECC-Com)in ACM Appendix 5.4B.

- **Refrigeration:** The energy consumption of commercial refrigeration equipment in a space expressed in watts per square foot of space floor area. Commercial refrigeration equipment power density (EPD) is used for walk in freezers, walk in coolers, and refrigerated casework. Other equipment such as Plug in coolers, vending machines and plug in refrigerators should be accounted for in receptacle loads.
- **Refrigeration (Schedule Name*):** Commercial refrigeration equipment schedule reference
- **Elevator Count:** The number of individual elevators within the space.
- **Elevator Count (Lost Frac.):** The fraction of heat lost to the exterior based on appliance energy use.
- **Elevator Count (Schedule Name*):** The use of an elevator represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method or Complete Building Method (not implemented in CBECC-Com) in ACM Appendix 5.4B.
- **Escalator Count:** The number of individual Escalators within the space
- **Escalator Count (Lost Frac.):** The fraction of heat lost to the exterior based on appliance energy use.
- **Escalator Count (Schedule Name*):** The use of an escalator represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method or Complete Building Method (not implemented in CBECC-Com) in ACM Appendix 5.4B.

***Schedules will be defaulted for compliance analysis**.

Natural Gas Use section

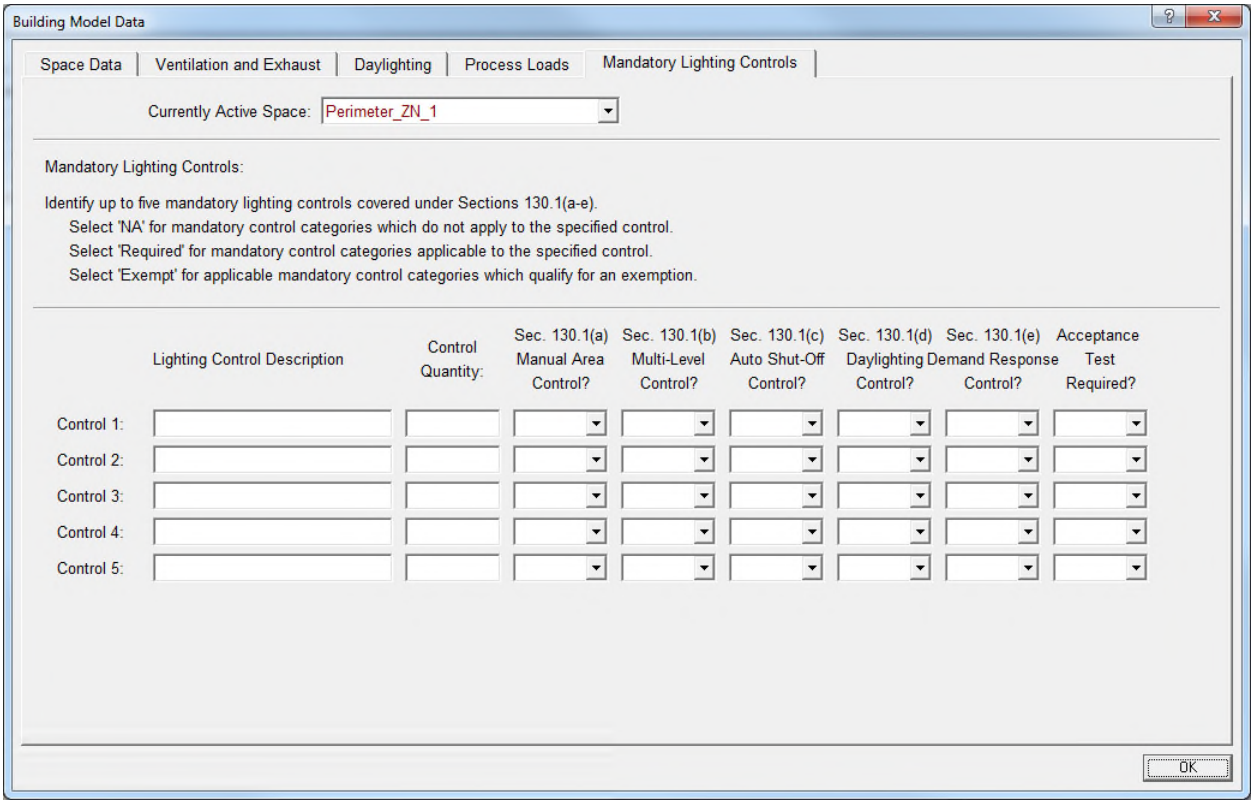
- **Gas Equipment:** The use of gas devices represented by a gas equipment power density (Btu/h-ft2) and associated with the occupancy type selected from the Area Category Method or Complete Building Method (not implemented in CBECC-Com) in ACM Appendix 5.4A.
- **Gas Equipment (Schedule Name*)**: The use of gas equipment represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method or Complete Building Method (not implemented in CBECC-Com) in ACM Appendix 5.4B.
- **Process Gas:** Process load is the gas energy consumption in the conditioned space of building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.
- **Process Gas (Radiant Frac.):** The fraction of radiant heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Gas (Latent Frac.):** The fraction of latent heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Gas (Lost Frac.):** The fraction of heat lost to the exterior is based on appliance energy use.
- **Process Gas (Schedule Name*):** The use of process gas represented by a 24 hour schedule (fraction of density) associated with the occupancy type selected from the Area Category

Method or Complete Building Method(not implemented in CBECC-Com) in ACM Appendix 5.4B.

***Schedules will be defaulted for compliance analysis**.

Space Data Screen (Mandatory Lighting Controls Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Mandatory Lighting Controls** tab.


Building Model Data
Space Data
Ventilation and Exhaust
Daylighting
Process Loads
Mandatory Lighting Controls
Currently Active Space: Perimeter_ZN_1
Mandatory Lighting Controls:
Identify up to five mandatory lighting controls covered under Sections 130.1(a-e).
Select 'NA' for mandatory control categories which do not apply to the specified control.
Select 'Required' for mandatory control categories applicable to the specified control.
Select 'Exempt' for applicable mandatory control categories which qualify for an exemption.
Lighting Control Description
Control Quantity:
Sec. 130.1(a) Manual Area Control?
Sec. 130.1(b) Multi-Level Control?
Sec. 130.1(c) Auto Shut-Off Control?
Sec. 130.1(d) Daylighting Control?
Sec. 130.1(e) Demand Response Control?
Acceptance Test Required?
Control 1:
Control 2:
Control 3:
Control 4:
Control 5:
OK

Input summary for the **Mandatory Lighting Controls** tab:

- **Lighting Control Description**: A description of the mandatory lighting control in a space, subject to the requirements of Standards, Section 130.1.
- **Control Quantity**: The quantity of each mandatory lighting control type present in a space, subject to the requirements of Standards, Section 130.1.
- **Sec. 130.1(a) Manual Area Control?:** Select NA, Required, or Exempt to indicate whether the control is a mandatory manual area control.
- **Sec. 130.1(b) Multi-Level Control?:** Select NA, Required, or Exempt to indicate whether the lighting control is a multi-level control.
- **Sec. 130.1(b) Auto Shut-Off Control?:** Select NA, Required, or Exempt to indicate whether the control is an auto shut-off control.
- **Sec. 130.1(b) Daylighting Control?:** Select NA, Required, or Exempt to indicate whether the control is a daylighting control.
- **Sec. 130.1(e) Demand Response Control?:** Select NA, Required, or Exempt to indicate whether the control is a demand responsive control.
- **Acceptance Test Required?:** Select NA, Required, or Exempt to indicate whether acceptance testing is required for the lighting control.

Interior Lighting System Data Screen

To access this screen, right click on a space and scroll down to **Create** in the drop-down box. Then click **InteriorLightingSystem.** The **Create InteriorLightingSystem** dialog box appears. Make your selections and click **OK.**

Input summary for Interior Lighting System Data:

- **Currently Active Interior Lighting System**: The name of the currently selected interior lighting system.
- **Parent Space Name**: The name of the parent space for the currently selected interior lighting system.
- **Parent Space IntLtgSpecMthd**: Interior lighting specification method.
- **Lighting System Name**: The name or description used to identify the interior lighting system.
- **Status**: Whether an InteriorLightingSystem is to be treated as New, Altered, Existing, or Future.
- **Lighting System Power (W)**: Total connected lighting power for all the luminaires in an interior lighting system. This total includes the loads for lamps and ballasts.
- **Regulated?** (check box): Select to indicate whether the lighting system's power is Regulated vs. Non-Regulated. The field defaults to Regulated (checked).
- **Exclusion Type**: If the lighting system is Non-Regulated, select the exclusion type from the options listed.

Luminaires section

- **Assigned Luminaire (1–5)**: Used to assign a Luminaire type to an interior lighting system.

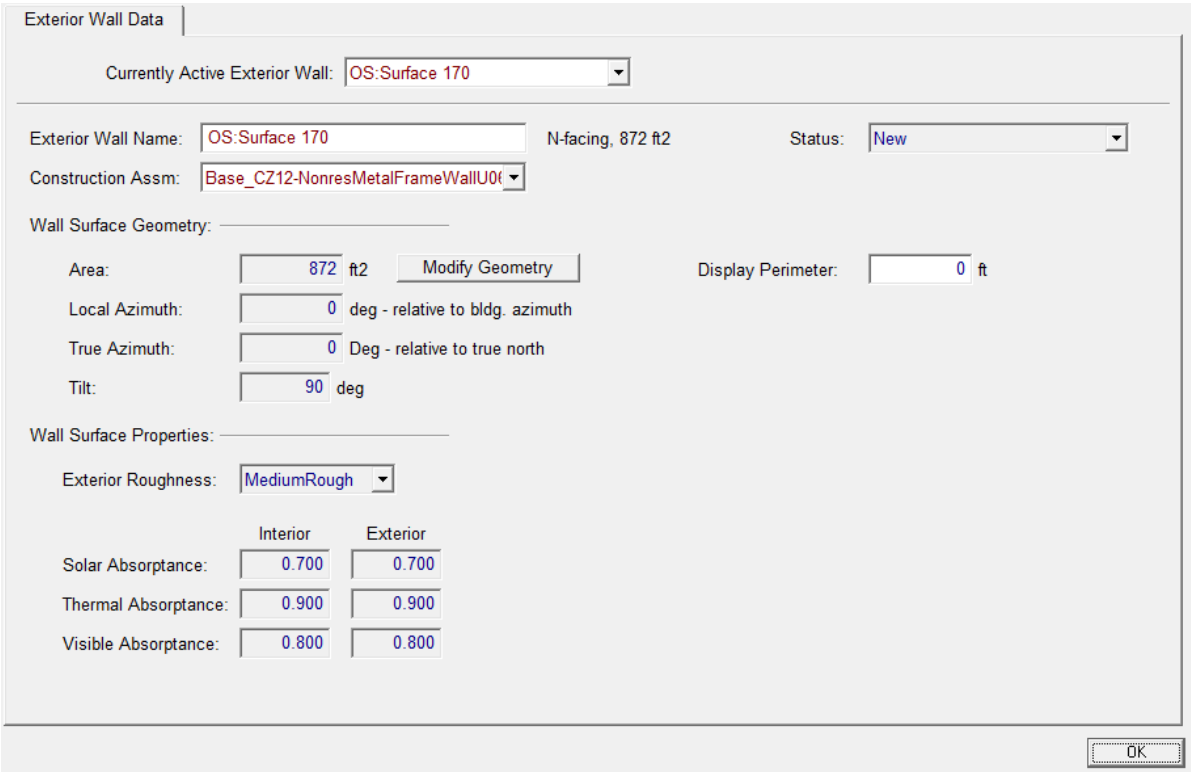
- **Quantity (1–5)**: Quantity of each assigned luminaire type associated with the interior lighting.
- **Luminaire Mounting Height**: The Luminaire Height of an IntLtgSys, only necessary for Tailored Method Baseline General and Additional Lighting Power Allowances.
- **Fraction Heat to Space**: Fraction of interior lighting heat gain going to space air.
- **Radiant Fraction of Space Heat**: Fraction of interior lighting radiant heat gain going to space surfaces.

Controls/Credits section

- **Assigned Daylit Zone**: Identifies the type of daylit area (Skylit, Primary Sidelit, Secondary Sidelit) in which 100% of the lights associated with the Interior Lighting System are located. A separate interior lighting system must be defined for luminaires associated with each of the Daylit Zone types (Skylit, Primary Sidelit, Secondary Sidelit, Uncontrolled).
- **Lighting Controls**: Selection of PAF Credit Type allows the software to apply the power adjustment factors (PAF) which represents the percent reduction in lighting power that will approximate the effect of the control. Models account for such controls by multiplying the controlled watts by (1-PAF). (PAFCredType, PartialOnOccupantSensingControl, OccupantSensingControls-1to125SF, OccupantSensingControls-126to250SF, OccupantSensingControls-251to500SF, ManualDimming, MultisceneProgrammableControls, DemandResponsiveControl, CombinedManualDimmingPlusPartialOnOccupantSensingControl)
- **Power Adjustment Factor**: Power adjustment factors (PAFs) represent the percent reduction in lighting power that will approximate the effect of the control. Models account for such controls by multiplying the controlled watts by (1-PAF).
- **Lighting Control Qty**: Primarily for reporting purposes; identifies the number of lighting controls associated with a particular interior lighting system.
- **Acceptance Test Required?** (check box): Select to indicate whether acceptance testing is required as per Standards, Section 130.4 (b). Primarily used for reporting purposes.
- **Allowance Type:** Custom Lighting Power Allowance Type for Interior Lighting Specified via Area Category Method. (Ornamental)
- **Allowance Area:** The Area (ft2) of to which the Area Category or Tailored Allowance (W/ft2) is applied.

Exterior Wall Data Screen

To access this screen, under Space data double click Surface data (Exterior Wall icon).



Input summary for the Exterior Wall Data screen:

- **Currently Active Exterior Wall:** The name of the currently selected exterior wall.
- **Exterior Wall Name (N-Facing, 872 ft2):** The name or description used to identify the exterior wall.
- **Status**: The exterior wall status, which can be New, Existing, or Altered.
- **Construction Assm:** Select the construction assembly reference (construction name) for an exterior wall, or select create/import ExteriorWall ConstructionAssembly (and apply only here). (Input is optional). If you select create/import, the Create ConstructAssembly dialog box appears. Make selections and click **OK**. The Construction Assembly Data screen then appears. Make selections and click **OK**.

Wall Surface Geometry section

- **Area (ft2):** The area of the exterior wall.
- **Display Perimeter:** Display Perimeter of an individual wall.
- **Local Azimuth:** Azimuth of exterior wall w/r to building coordinated.
- **True Azimuth:** Azimuth of exterior wall w/r to true north.
- **Tilt:** The angle between the roof surface and horizontal.

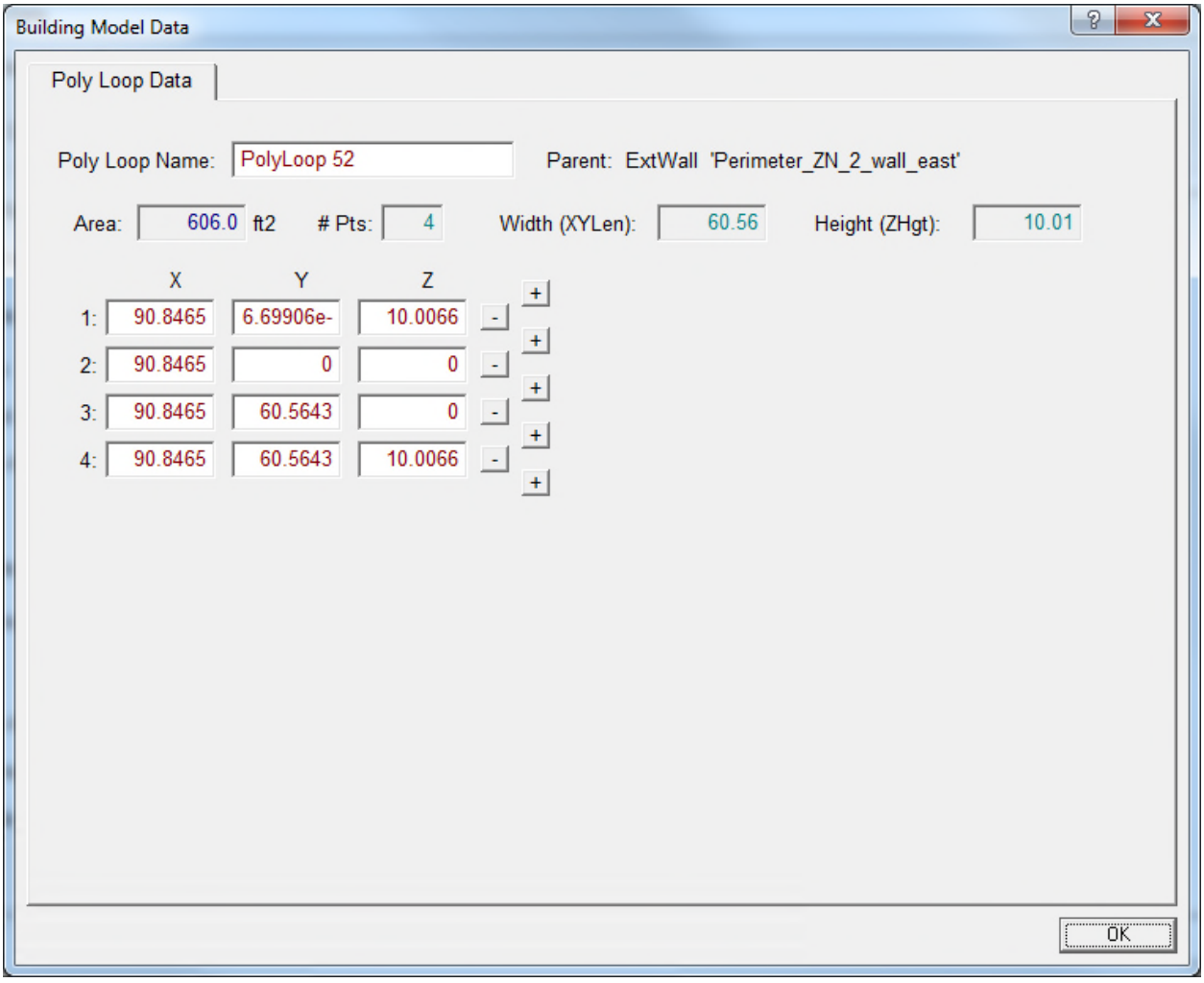
Wall Surface Properties section

- **Exterior Roughness:** Select the surface texture affecting convection.
- **Solar Absorptance:** The fraction of the solar energy absorbed by the wall.
- **Thermal Absorptance:** The fraction of infrared energy absorbed by the wall.
- **Visible Absorptance:** The fraction of visible light absorbed by the wall.

Modify Geometry button
To access surface geometry (child poly loop object), click this button. The **Poly Loop Data** screen appears (see screen below).

Poly Loop Data Screen

The **Poly Loop Data** screen is accessed by clicking the **Surface Geometry** button, which appears on the Surface Data screens. Enter data in the **Poly Loop Data** screen and click **OK**.



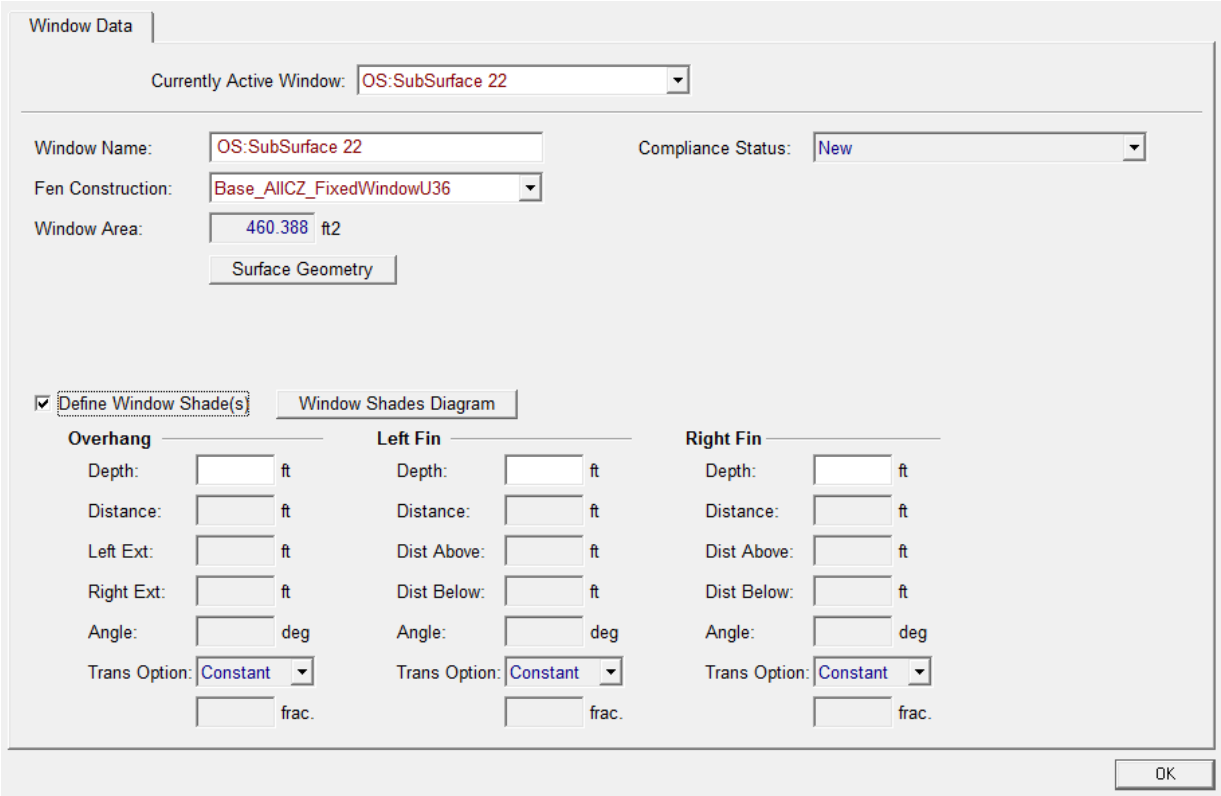
Input summary for the Poly Loop Data screen:

- **Poly Loop Name:** The name or description used to identify the Poly Loop.
- **Area:** Area of the Poly Loop.
- **# Pts**: The number of points.
- **Width (XYLen):** Width of the polygon calculated by the software based on the X/Y vertices..
- **Height (ZHgt)**: Range of Z coordinates in the polyloop..
- **X:** The X coordinate of a poly loop vertex.
- **Y:** The Y coordinate of a poly loop vertex.
- **Z:** The Z coordinate of a poly loop vertex.

Note: Use the plus and minus signs to insert and delete points. Deleting a point can cause the poly loop to no longer be valid.

Subsurface Data (Window) Screen

To access this screen, under **Surface** data, double click **SubSurface** data (Window icon).



Input summary for the SubSurface Window Data:

- **Currently Active Window:** The name of the currently selected window.
- **Compliance Status:** The compliance status of the window. Options are New, Altered, and Existing.
- **Window Name**: The name or description used to identify the window.
- **Fen Construction**: Select the Fenestration Construction reference for a window. Options are none, create new VerticalFenestration FenestrationConstruction (applied only here), or an existing construction. For a new fenestration construction, select the "create new" option, and the **Create FenestrationConstruction** dialog box appears. Input data and click **OK**. The Fenestration Construction Data screen appears.
- **Window Area** (ft2): Calculates area of each window.

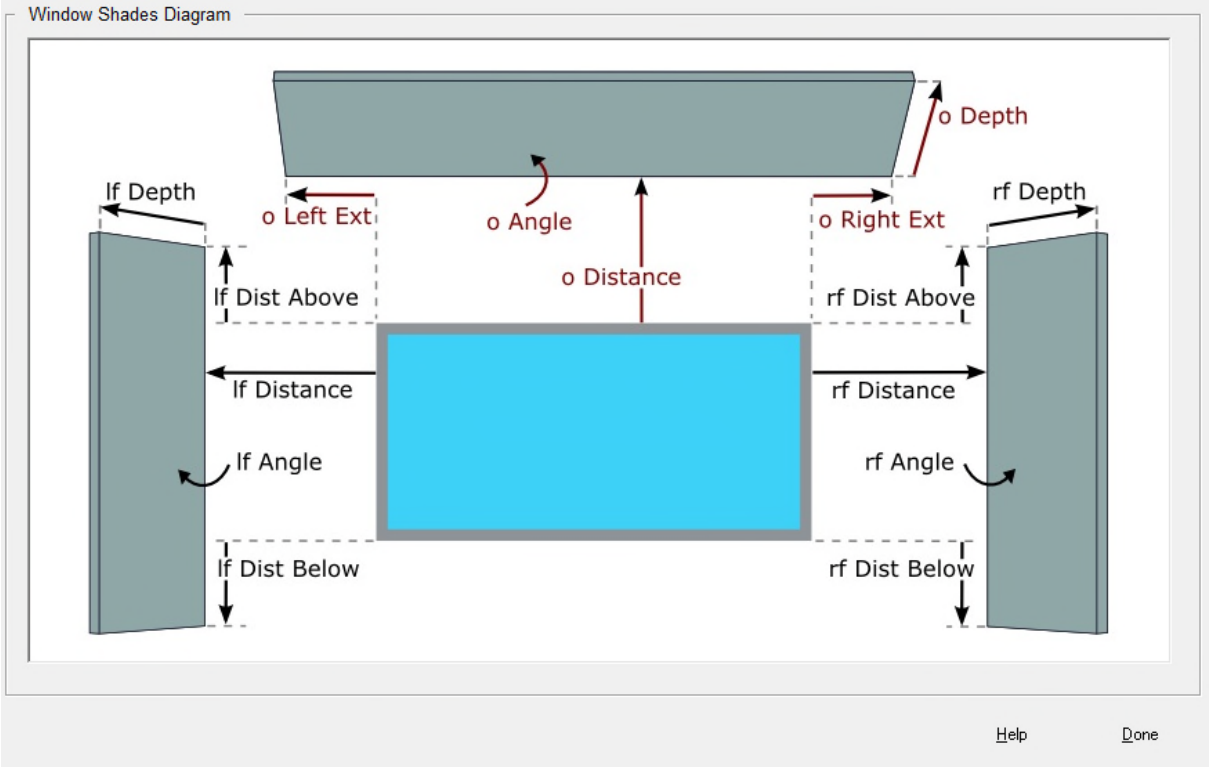
Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

- **Define Window Shade(s)** (check box): Select to specify data to describe window overhang and/or fins. Specify the dimensions of the shades from the Window Shades Diagram.

Window Shades Diagram button

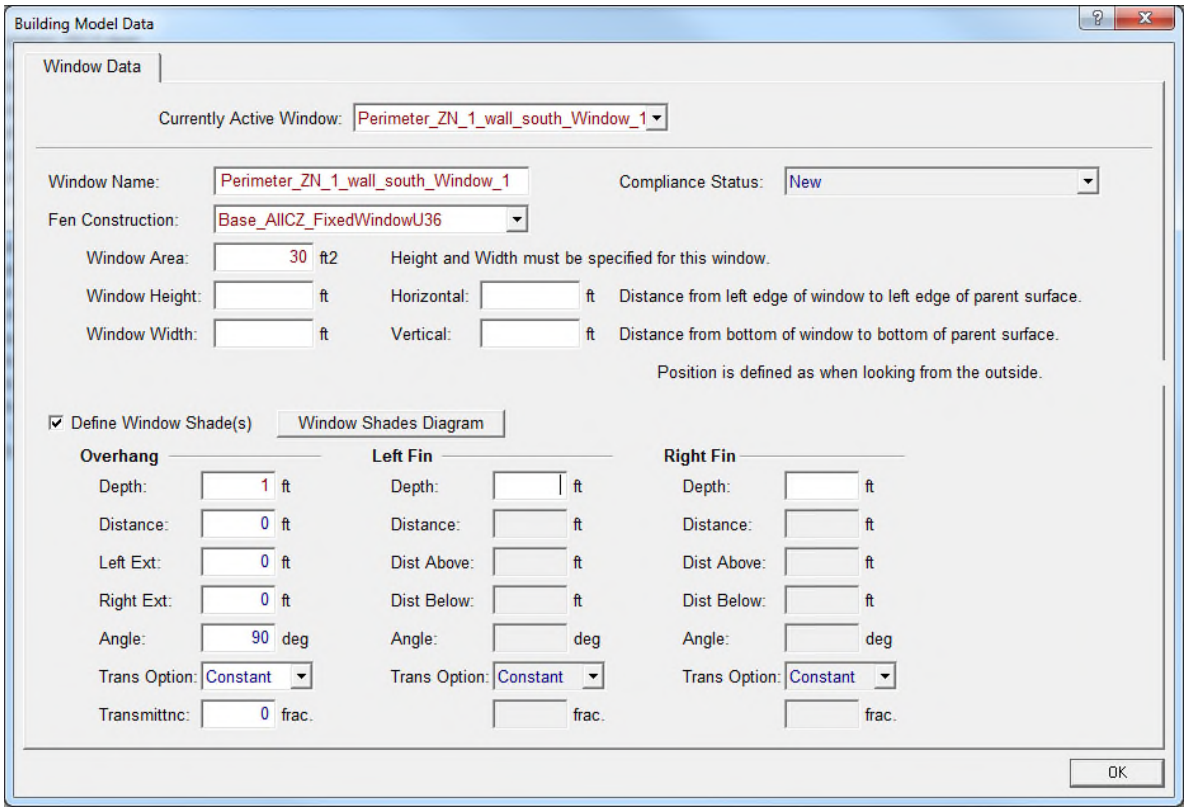
Click this button to show the diagram for use in specifying the dimensions of the shades.



For Overhang, Left Fin, and Right Fin, enter the following data. (Input is optional.)

- **Depth** (Overhang, Left Fin, Right Fin): The depth the shade extends from the wall.
- **Distance** (Overhang, Left Fin, Right Fin)**:** The distance from the edge of the window to the base of the shade.
- **Left Ext** (Overhang): The distance the shade extends past the left edge of the window.
- **Right Ext** (Overhang): The distance the shade extends past the right edge of the window.
- **Dist Above** (Left and Right Fins): The distance the shade extends above the window.
- **Dist Below** (Left and Right Fins): The distance the shade extends below the window.
- **Angle** (Overhang, Left Fin, Right Fin)**:** The angle the shade is mounted relative to the window.
- **Trans Option** (Overhang, Left Fin, Right Fin)**:** Select whether the transmittance of the shade is constant, or varies based on a schedule.
- **Frac.** (Overhang, Left Fin, Right Fin): The schedule defining the fraction of light that can pass through the shade.

For Simplified Geometry Projects, a few additional inputs are required for specifying window shades:

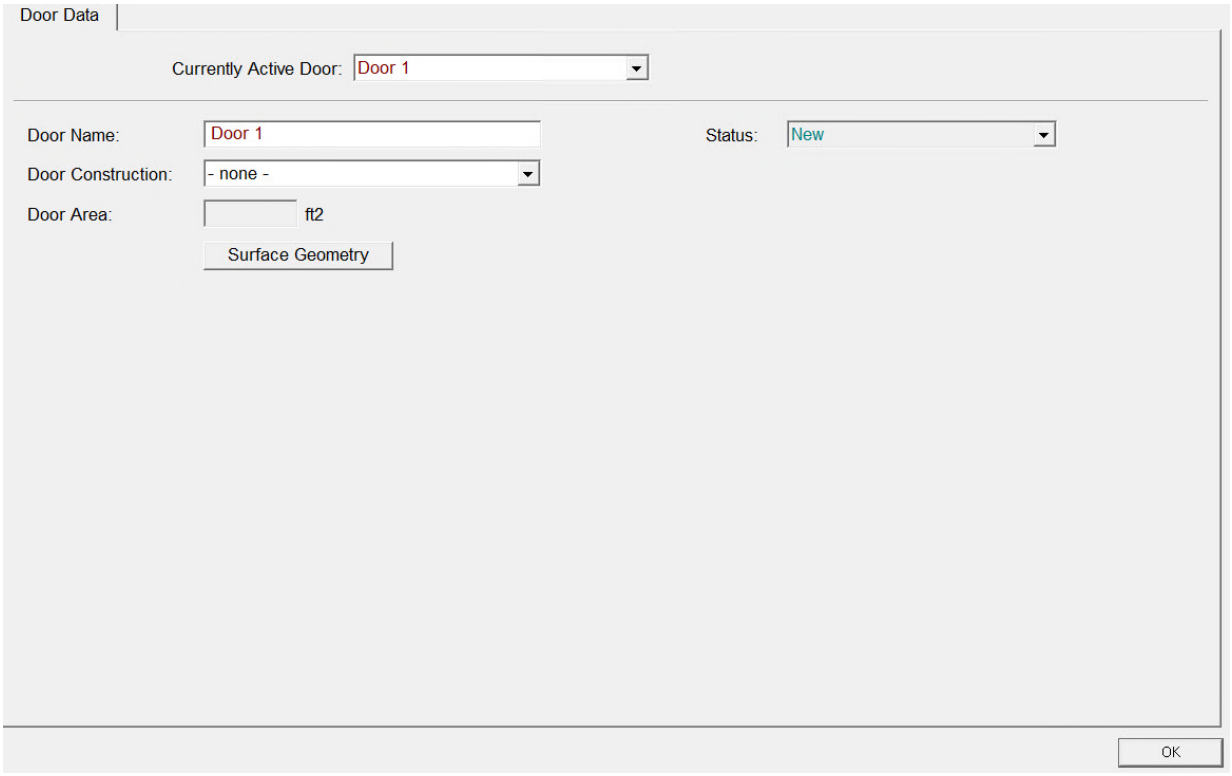


Input summary for the SubSurface Window Data in Simplified Geometry:

- **Currently Active Window:** The name of the currently selected window.
- **Compliance Status:** The compliance status of the window. Options are New, Altered, and Existing.
- **Window Name**: The name or description used to identify the window.
- **Fen Construction**: Select the Fenestration Construction reference for a window. Options are none, create new VerticalFenestration FenestrationConstruction (applied only here), or an existing construction. For a new fenestration construction, select the “create new” option, and the **Create FenestrationConstruction** dialog box appears. Input data and click **OK**. The Fenestration Construction Data screen appears.
- **Window Area** (ft2): Area of window.
- **Window Height** (ft): Height of window
- **Window Width** (ft): Width of window
- **Horizontal:** Distance of the left edge of the window from left edge of parent surface(exterior wall) when looking from outside
- **Vertical:** Distance of the bottom of the window from the bottom of the parent surface (exterior wall) when looking from outside.

SubSurface (Door) Data Screen

To access this screen, right click **Surface** (Exterior Wall icon) and scroll down to **Create** in the drop-down box. Then click **Door.** The **Create Door** dialog box appears. Make your selections and click **OK.**



Input summary for SubSurface data (Door Data):

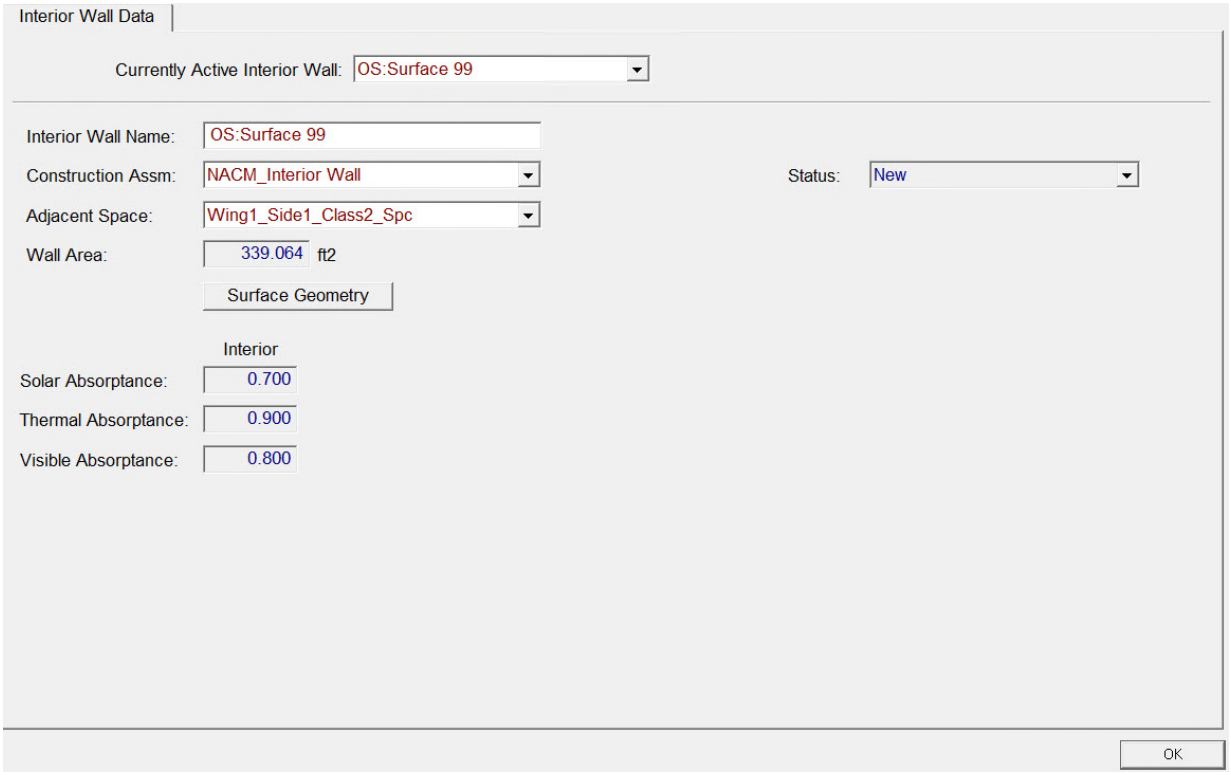
- **Currently Active Door**: Select the name of the currently selected door, or create new Door. The Create Door dialog box appears. Make selections and click **OK**. The new door is shown in the project tree.
- **Door Name**: The name or description used to identify the door.
- **Status:** The compliance status of the door.
- **Door Construction**: Select the door construction (input is optional). Options are none, and create/import DoorConstruction.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Surface Data (Interior Wall) Screen

To access this screen, under Space Data, double click on Surface data (Int. wall icon).



Input summary for Surface Data (Interior Wall):

- **Currently Active Interior Wall**: The name of the currently selected interior wall.
- **Interior Wall Name**: The name or description used to identify the interior wall.
- **Construction Assm**: Select the Construction assembly reference (construction name) for a demising wall (input is optional). A reference to a construction assembly. Options are none, an existing option, or create new InteriorWall ConstructAssembly.
- **Status: T**he compliance status of the door.
- **Adjacent Space**: Select the space on the other side of an interior partition.
- **Wall Area (ft2)**: The area of the interior wall.

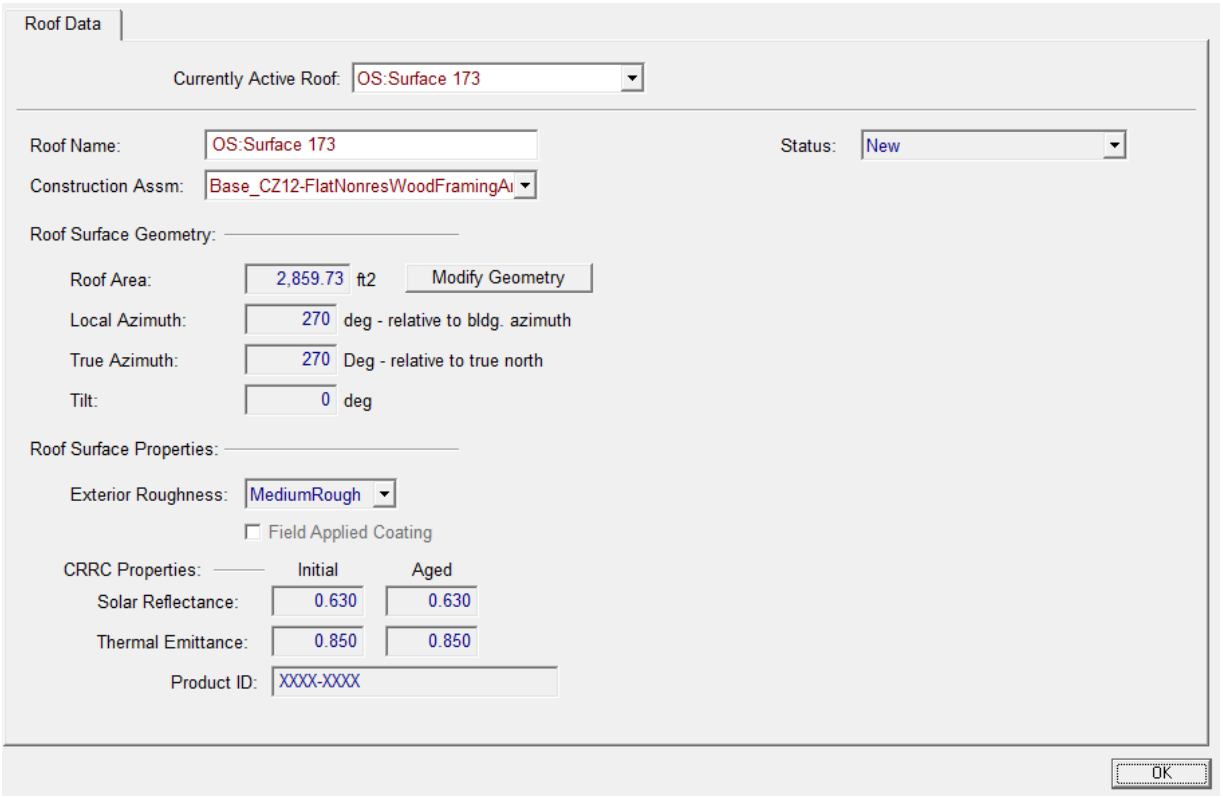
- **Solar Absorptance:** The fraction of the solar energy absorbed by the wall.
- **Thermal Absorptance:** The fraction of infrared energy absorbed by the wall.
- **Visible Absorptance:** The fraction of visible light absorbed by the wall.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Roof Data (Surface Data) Screen

To access this screen, under Space Data, double click **Surface** data (Roof icon).



Input summary for Surface Data (Roof):

- **Currently Active Roof**: The name of the currently selected roof.
- **Roof Name**: A unique name that identifies the roof.
  A unique name or code that identifies the roof and ties it to the construction documents submitted for energy code review. It is not mandatory to name roofs.
- **Status**: The roof's compliance status.
- **Construction Assm**: Select the construction assembly reference for a roof (input is optional). Options are none, an existing option, or create/import Roof ConstructAssembly. If you select create/import , the Create ConstructAssembly dialog box appears. Make selections and click **OK**. The Construction Assembly Data screen then appears. Make selections and click **OK.**

Roof Surface Geometry section

- **Roof Area**: Calculate area of each roof (not editable).
- **Local Azimuth:** Angle between roof vector 'P' and True North as defined by NVector
- **True Azimuth:** The Azimuth of a surface with respect to true north
- **Tilt (deg):** The angle between the roof surface and horizontal

Roof Surface Properties section

- **Exterior Roughness**: The surface texture affecting convection. Options are VeryRough, Rough, MediumRough, MediumSmooth, Smooth, and VerySmooth.
- **Field Applied Coating** (check box): Option checked if a coating was applied in the field.

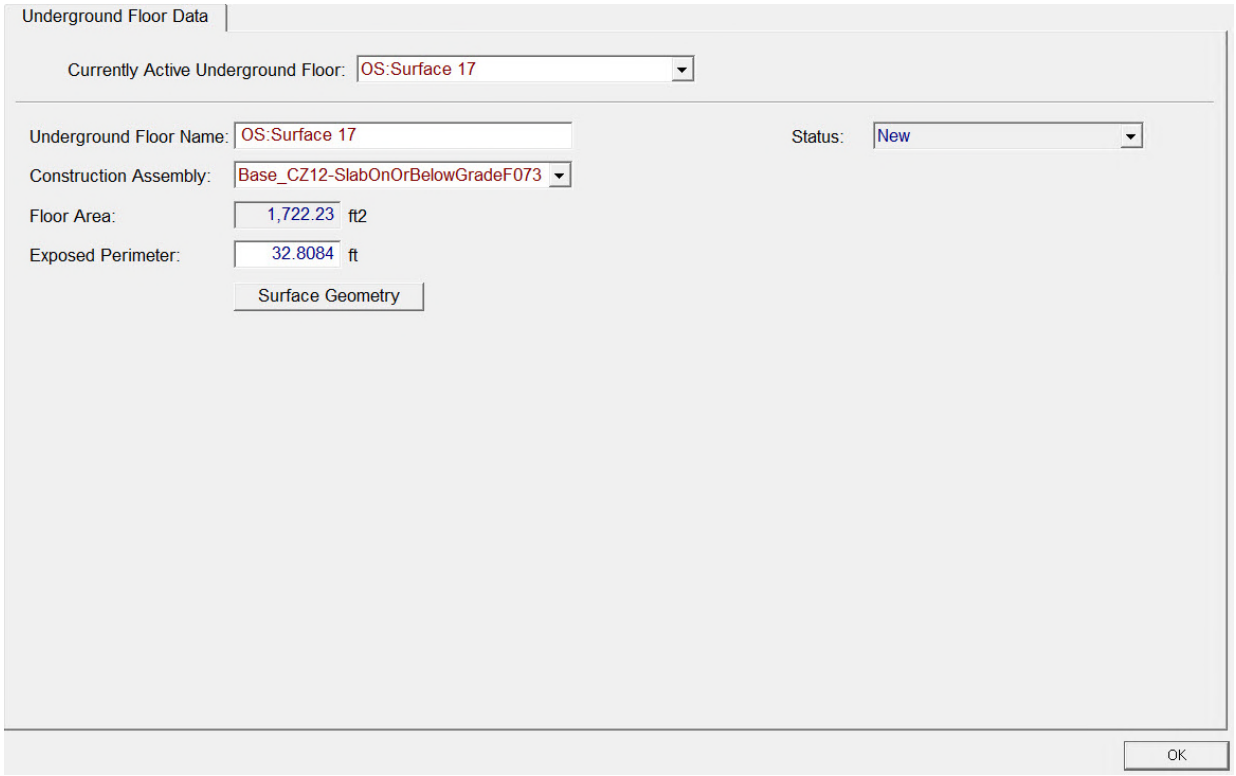
- **Solar Reflectance (Initial)**: The fraction of solar energy reflected by the initial coating.
- **Solar Reflectance (Aged)**: The fraction of solar energy reflected by the aged coating.
- **Thermal Emittance (Initial):** The fraction infrared energy emitted by the initial coating.
- **Thermal Emittance (Aged):** The fraction infrared energy emitted by the aged coating.
- **Product ID**: The unique identifier of the coating.

Modify Geometry button

To access surface geometry (child poly loop object), click this button. Enter data in the Poly Loop Data screen and click **OK**. (See the Poly Loop Data Screen.)

Underground Floor Data (Surface Data) Screen

To access this screen, under Space Data double click **Surface** data (Floor icon).



Input summary for Underground Floor (Surface data):

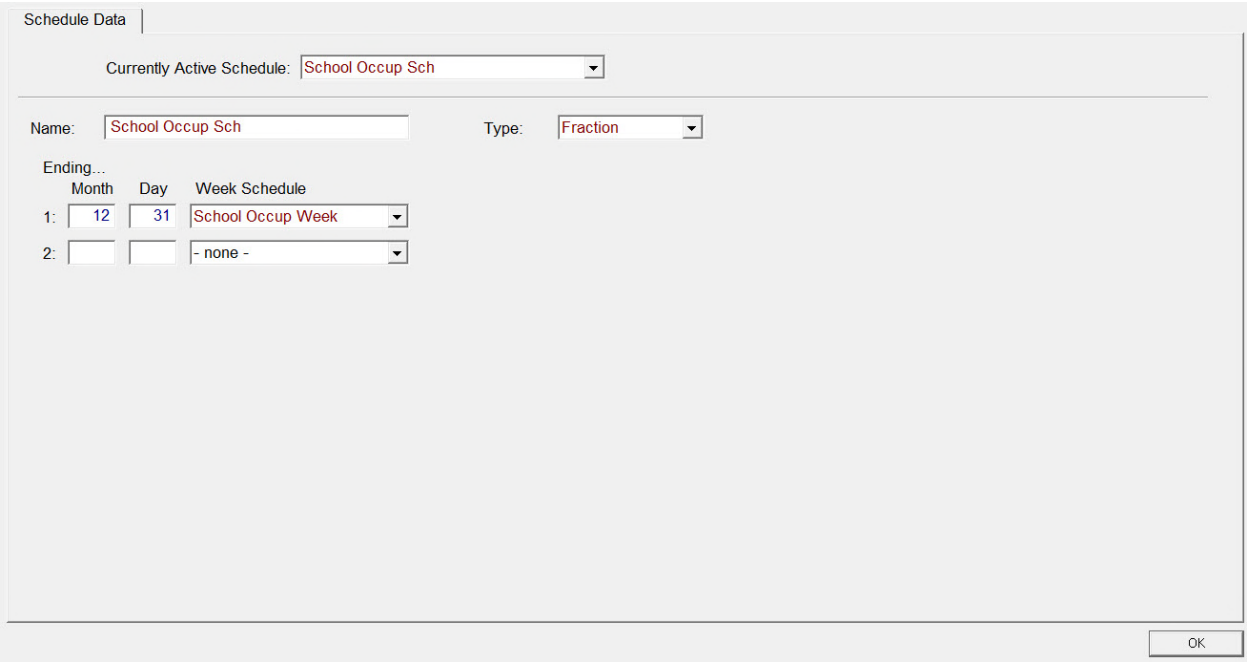
- **Currently Active Underground Floor**: The name of the currently selected underground floor.
- **Underground Floor Name**: The name or description used to identify the underground floor.
- **Status**: The underground floor's compliance status.
- **Construction Assembly**: Select the construction assembly reference (construction name) for an Underground Floor (input is optional). A reference to a construction assembly. Options are none, an existing option, and create/import UndergroundFloor ConstructAssembly.
- **Floor Area (ft2)**: The area of the floor.
- **Exposed Perimeter (ft)**: The area of the exposed floor.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Schedules Data Screen

To access this screen, under Project name, expand **Schedules** (by clicking on the plus sign), and double click an option (Schedule icon).



Input summary for **Schedule** Data:

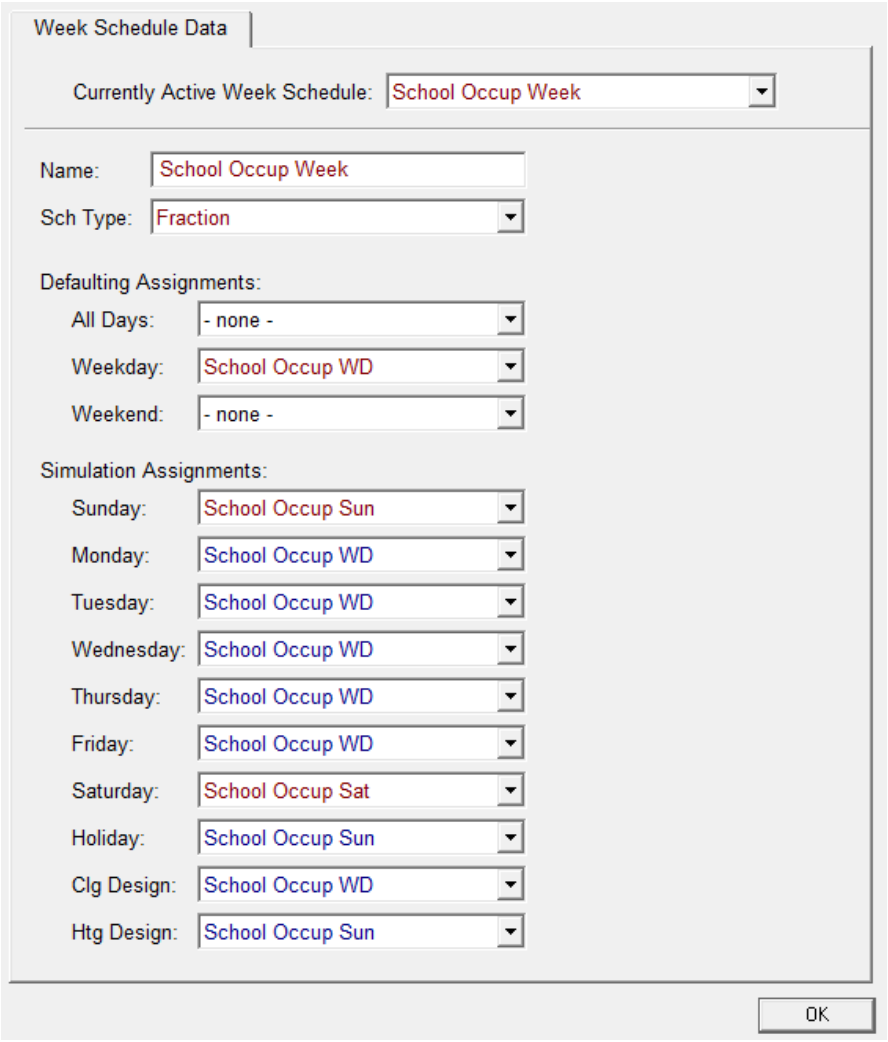
- **Currently Active Schedule**: The name of the currently active schedule.
- **Name**: The name of the schedule.
- **Type**: Select a schedule control mechanism. Options are Fraction, OnOff, and Temperature.

Ending…

- **Month**: Index of ending month (1–12) for the first referenced week schedule.
- **Day**: Index of ending day (1–31) for the first referenced week schedule.
- **Week Schedule:** Select the week schedule used in the time period. Options are create/import Temperature ScheduleWeek, School Occup Week, Cooling Tstat Week, and Heating Tstat Week.

Schedules Weeks Data (Weekly) Screen

To access this screen, under Project name expand **ScheduleWeeks** (by clicking the plus sign), and double click an option (Schedule icon).



Input summary for **ScheduleWeeks** data:

- **Currently Active Week Schedule**: The name of the currently selected week schedule.
- **Name:** The name of the schedule.
- **Sch Type:** Select a schedule control mechanisms. Options are Fraction, OnOff, and Temperature.

Defaulting Assignments section

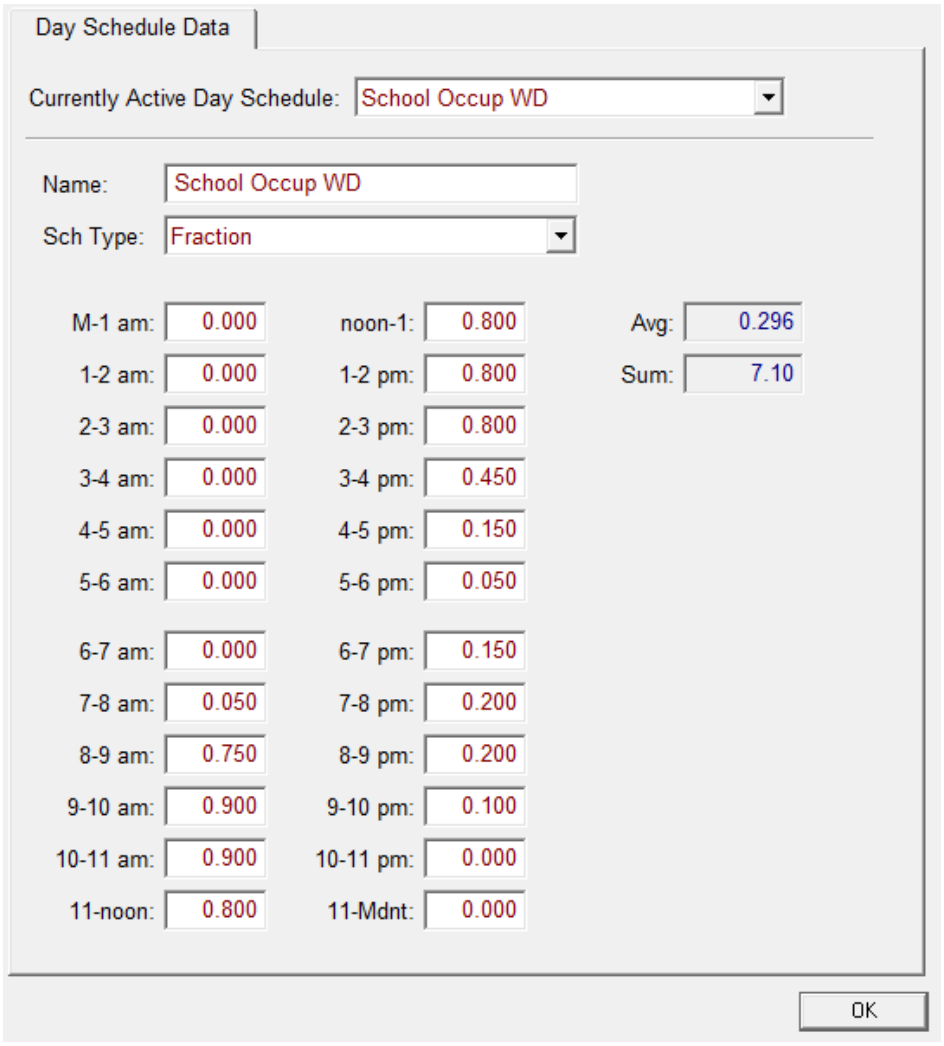
- **All Days:** Select an All Days schedule or create/import Fraction ScheduleDays. (Input is optional.)
- **Weekday:** Select a Weekday schedule or create/import Fraction ScheduleDays. (Input is optional.)
- **Weekend:** Select a Weekend schedule or create/import Fraction ScheduleDays. (Input is optional.)

Simulation Assignments section

- **Sunday**: Select the Sunday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Monday**: Select the Monday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Tuesday**: Select the Tuesday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Wednesday**: Select the Wednesday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Thursday**: Select the Thursday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Friday**: Select the Friday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Saturday:** Select the Saturday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Holiday**: Select the Holiday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Clg Design:** Select the Cooling Design (sizing) day schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Htg Design**: Select the Heating Design (sizing) day schedule, or create/import Fraction ScheduleDay. (Input is optional.)

Schedules Days Data (Daily) Screen

To access this screen, under Project name expand **ScheduleDays** (by clicking the plus sign), and double click an option (Schedule icon).



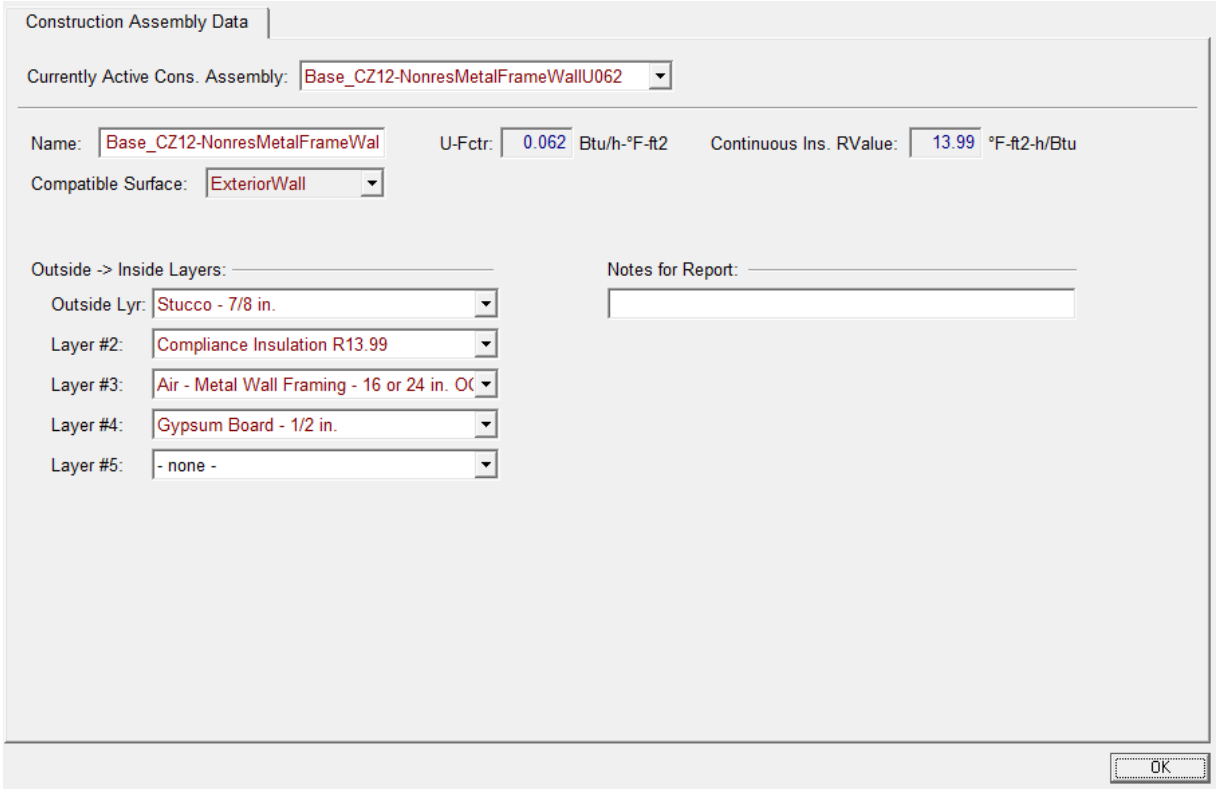
Input Summary screen for **ScheduleDays** data:

- **Currently Active Day Schedule**: The name of the currently selected day schedule.
- **Name:** The name or description used to identify the day schedule.
- **Sch Type**: Select the schedule control mechanisms. Options are Fraction, OnOff, and Temperature.
- **Avg**: The average of hourly schedule values.
- **Sum**: The sum of hourly schedule values.
- **M-1 am**: One hour occurrence between midnight and 1 a.m.
- **1-2 am**: One hour occurrence between 1 a.m. and 2 a.m.
- **2-3 am:** One hour occurrence between 2 a.m. and 3 a.m.
- **3-4 am**: One hour occurrence between 3 a.m. and 4 a.m.
- **4-5 am**: One hour occurrence between 4 a.m. and 5 a.m.
- **5-6 am**: One hour occurrence between 5 a.m. and 6 a.m.

- **6-7 am**: One hour occurrence between 6 a.m. and 7 a.m.
- **7-8 am**: One hour occurrence between 7 a.m. and 8 a.m.
- **8-9 am**: One hour occurrence between 8 a.m. and 9 a.m.
- **9-10 am**: One hour occurrence between 9 a.m. and 10 a.m.
- **10-11 am**: One hour occurrence between 10 a.m. and 11 a.m.
- **11-noon**: One hour occurrence between 11 a.m. and noon.
- **noon-1**: One hour occurrence between noon and 1 p.m.
- **1-2 pm**: One hour occurrence between 1 p.m. and 2 p.m.
- **2-3 pm**: One hour occurrence between 2 p.m. and 3 p.m.
- **3-4 pm**: One hour occurrence between 3 p.m. and 4 p.m.
- **4-5 pm**: One hour occurrence between 4 p.m. and 5 p.m.
- **5-6 pm**: One hour occurrence between 5 p.m. and 6 p.m.
- **6-7 pm**: One hour occurrence between 6 p.m. and 7 p.m.
- **7-8 pm**: One hour occurrence between 7 p.m. and 8 p.m.
- **8-9 pm:** One hour occurrence between 8 p.m. and 9 p.m.
- **9-10 pm**: One hour occurrence between 9 p.m. and 10 p.m.
- **10-11 pm**: One hour occurrence between 10 p.m. and 11 p.m.
- **11-Mdnt**: One hour occurrence between 11 p.m. and midnight.

Construction Assembly Data Screen

To access this screen, under Project name expand **ConstructAssemblies** and double click an option (Construction Assembly icon).


Construction Assembly Data
Currently Active Cons. Assembly: Base_CZ12-NonresMetalFrameWallU062
Name: Base_CZ12-NonresMetalFrameWal
U-Fctr: 0.062 Btu/h-°F-ft2
Continuous Ins. RValue: 13.99 °F-ft2-h/Btu
Compatible Surface: ExteriorWall
Outside -> Inside Layers:
Outside Lyr: Stucco - 7/8 in.
Layer #2: Compliance Insulation R13.99
Layer #3: Air - Metal Wall Framing - 16 or 24 in. OC
Layer #4: Gypsum Board - 1/2 in.
Layer #5: - none -
Notes for Report:
OK

Input summary for **ConstructAssemblies** data:

- **Currently Active Cons. Assembly:** The name of the currently selected construction assembly.
- **Name:** The name or description used to identify the construction assembly.
- **U-Fctr:** The overall U Factor of the selected Construction Assembly.
- **Continuous Ins. RValue:** The sum of the continuous insulation RValues for each construction assemblies.
- **Compatible Surface:** The type of surface object that this construction assembly is assigned to.

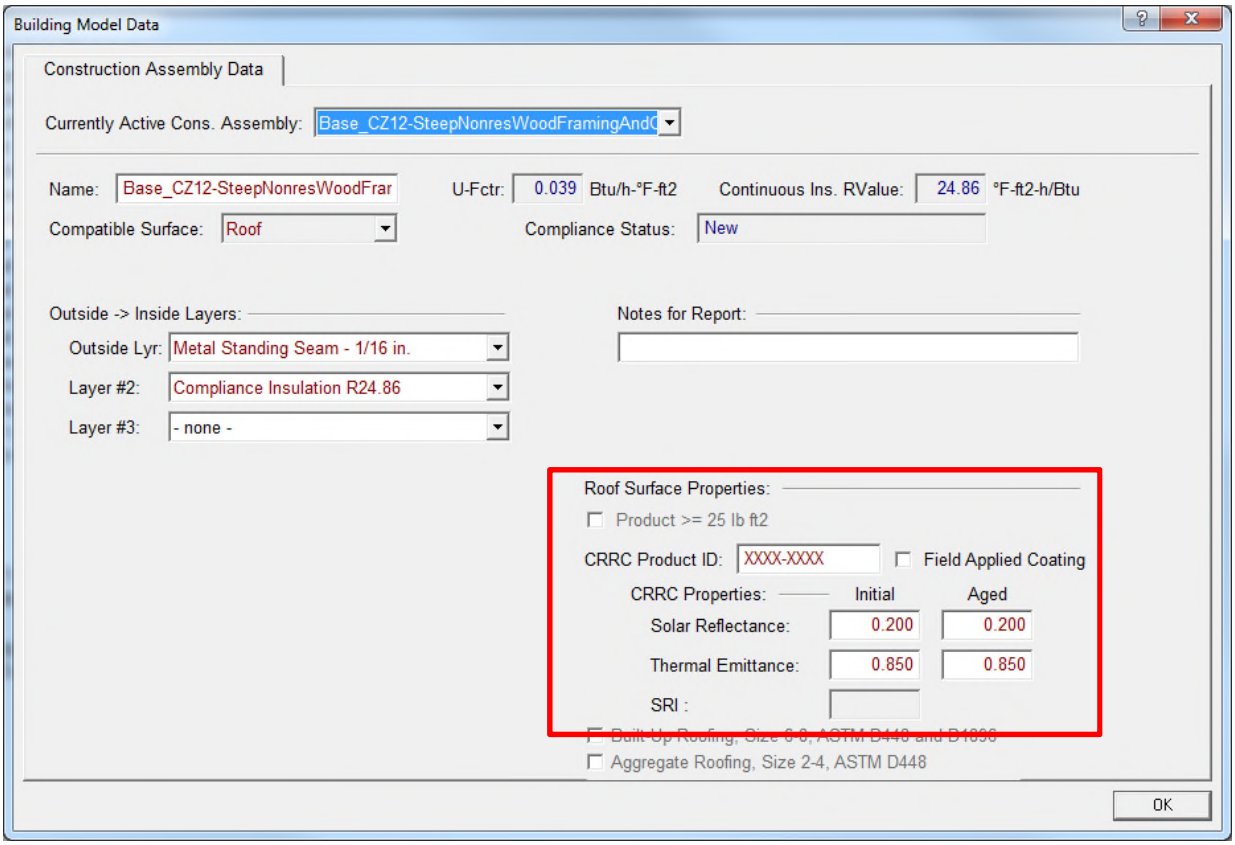
Outside -> Inside Layers section

- **Outside Lyr:** Select the material specified in the outside layer, or select create/import Material.
- **Layer #2:** Select the material specified in the second layer, or select create/import Material.
- **Layer #3:** Select the material specified in the third layer, or select create/import Material.
- **Layer #4:** Select the material specified in the fourth layer, or select create/import Material.
- **Layer #5:** Select the material specified in the fifth layer, or select create/import Material.
- **Notes for Report:** Enter notes about the construction assembly that will be added to the report.

Construction Assembly Data Screen (Compatible Surface = Roof)

To access this screen, under Project name expand **ConstructAssemblies** and double click a Roof option (Construction Assembly icon).

Note: Selecting *Compatible Surface = Roof* prompts you to add additional inputs (red box below).



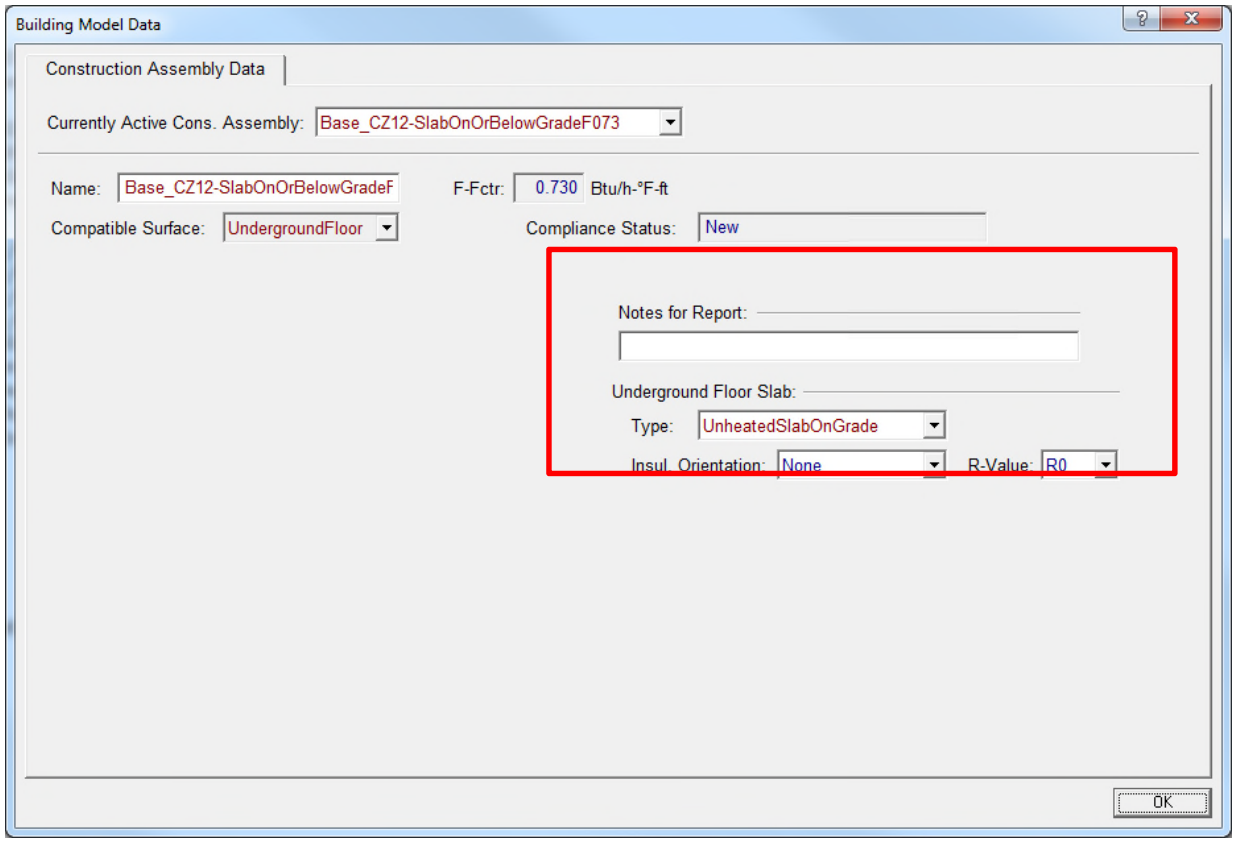
Input summary for the **Roof Surface Properties** section (see red box):

- **Product >= 25 lb ft2:** Check box for Products >= 25 lb/ft2.
- **CRRC Product ID**: A string of letters or numbers serving as a unique identifier of the coating.
- **Field Applied Coating** (check box): A flag to indicate if the roofing surface is from a coating applied on site or not.
- **Solar Reflectance** (Initial): The Initial Reflectance value from Cool Roof Rating Council (CRRC) testing of the roofing.
- **Solar Reflectance** (Aged): The Aged Reflectance value from CRRC testing of the roofing.
- **Thermal Emittance** (Initial): The Initial Emittance value from CRRC testing of the roofing.
- **Thermal Emittance** (Aged): The Aged Emittance value from CRRC testing of the roofing.
- **SRI:** The solar reflectance index.
- **Built-Up Roofing, Size 6-8, ASTM D448 and D1896:** check this box for built up roofing with size 6-8 complying with ASTM D448 and D1896
- **Aggregate Roofing, Size 2-4, ASTM D448**: check this box for aggregate roofing with size 2-4 complying with ASTM D448

Construction Assembly Data Screen (Compatible Surface = UndergroundFloor)

To access this screen, under Project name expand **ConstructAssemblies** and double click (Underground Floor) option (Construction Assembly icon).

Note: Selecting *Compatible Surface = UndergroundFloor* prompts you to add additional inputs (see the red box below).

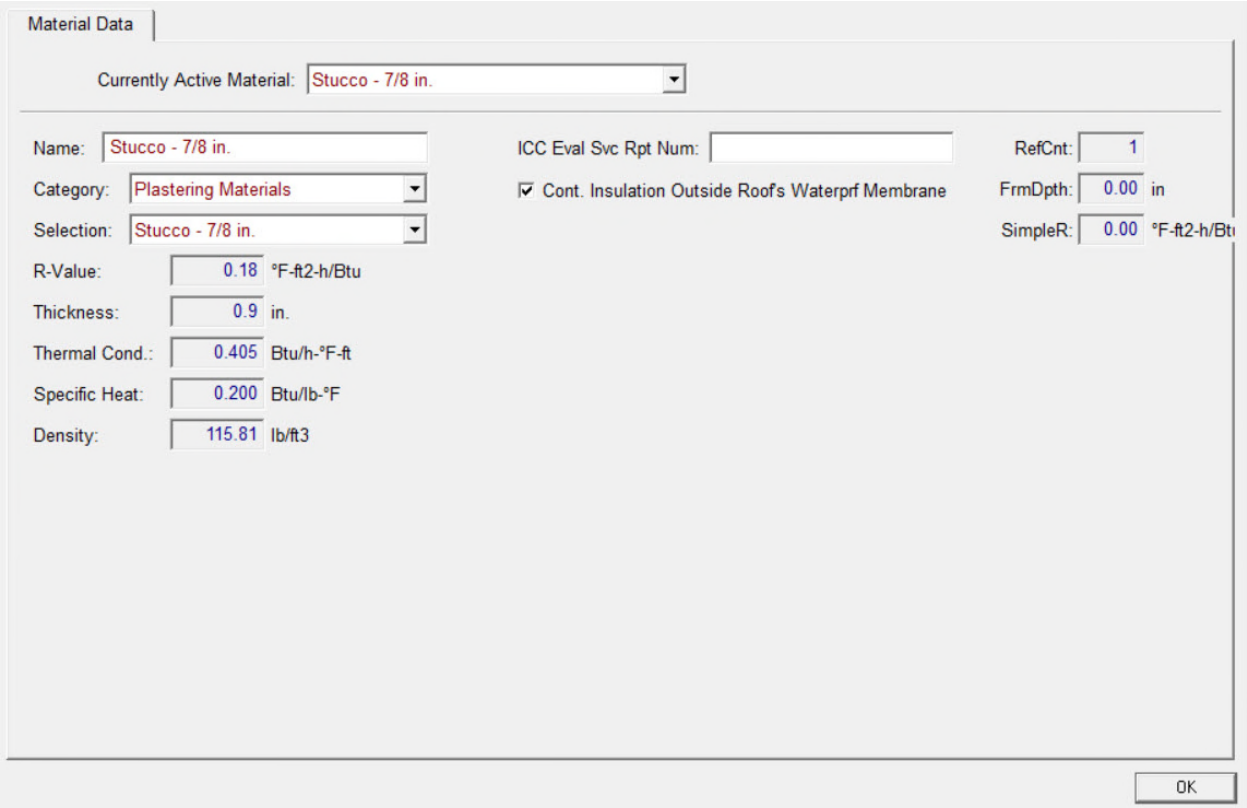


Input summary for **Underground Floor Slab** section (red box):

- **Notes for Report**: Enter notes for report. (Input is optional.)
- **Type:** Select the Underground slab type. Available options are HeatedSlabOnGrade, HeatedSlabBelowGrade, UnheatedSlabOnGrade, and UnheatedSlabBelowGrade.
- **Insul. Orientation**: Select the location and extent of slab-on-grade floor insulation.
- **R-Value**: Select the nominal R-value of the underground floor slab.

Material Data (Single Layer) Screen (Category = Stucco)

To access this screen, under Project name expand **Materials** and double click the **Stucco** option (Materials icon).

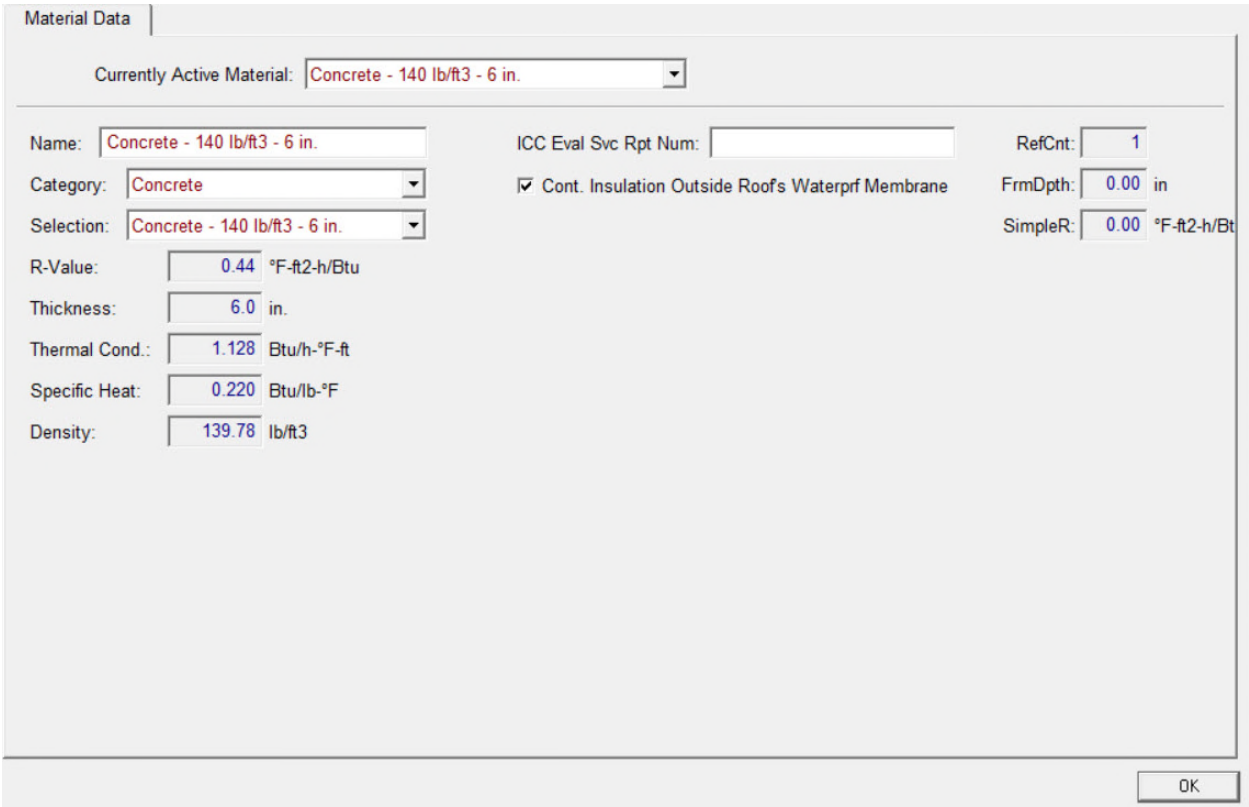


Input summary for **Material Data** screen (single layer):

- **Currently Active Material**: The name of the currently selected active material.
- **Name:** The name or description used to identify the active material.
- **Category:** Select the name or code for a type of material used as a layer in construction assemblies.
- **Selection:** Select the material used from the available options.
- **ICC Eval Svc Rpt Num:** The ICC Evaluation Service Report number for a spray foam or other non-standard insulating product.
- **Cont. Insulation Outside Roof's Waterprf Membrane** (check box): Check if insulation is installed completely on the outside of the roof's waterproof membrane.
- **RefCnt:** The number of times this material is referenced by ConsAssm objects.
- **FrmDpth:** The depth (in inches) of composite layer cavity.
- **SimpleR:** The R-value of the composite layer.
- **R-Value:** The R-value of the material.
- **Thickness:** The thickness of the material.
- **Thermal Cond.:** The thermal conductivity of the material.
- **Specific Heat:** The specific heat of the material.
- **Density**: The density of the material.

Materials Data (Single Layer) Screen (Category = Concrete)

To access this screen, expand **Materials** and double click the **Concrete** option (Materials icon).


Material Data
Currently Active Material: Concrete - 140 lb/ft3 - 6 in.
Name: Concrete - 140 lb/ft3 - 6 in.
Category: Concrete
Selection: Concrete - 140 lb/ft3 - 6 in.
R-Value: 0.44 °F-ft2-h/Btu
Thickness: 6.0 in.
Thermal Cond.: 1.128 Btu/h-°F-ft
Specific Heat: 0.220 Btu/lb-°F
Density: 139.78 lb/ft3
ICC Eval Svc Rpt Num:
Cont. Insulation Outside Roof's Waterprf Membrane
RefCnt: 1
FrmDpth: 0.00 in
SimpleR: 0.00 °F-ft2-h/Bt
OK

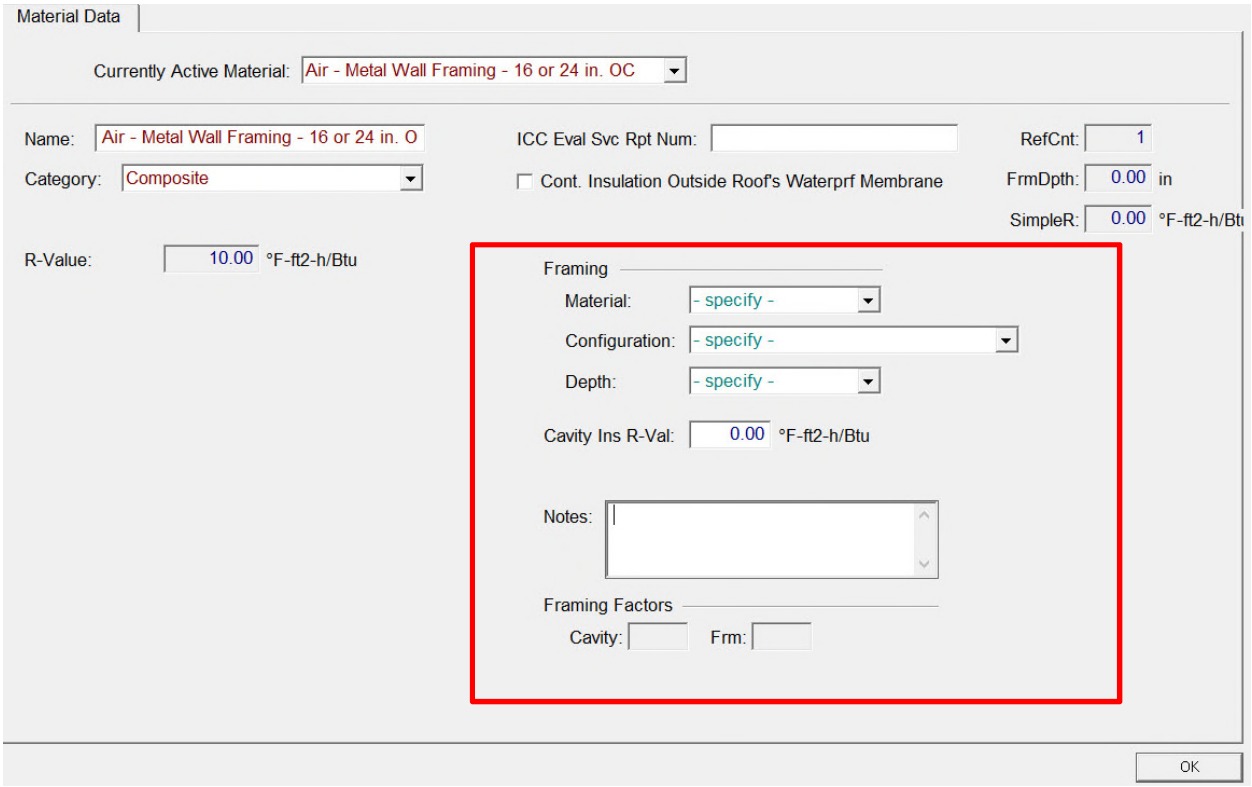
Input summary for **Material Data** screen (Concrete):

- **Currently Active Material**: The name of the currently selected active material.
- **Name:** The name or description used to identify the active material.
- **Category:** Select the name or code for a type of material used as a layer in construction assemblies.
- **ICC Eval Svc Rpt Num:** The ICC Evaluation Service Report number for a spray foam or other non-standard insulating product.
- **Cont. Insulation Outside Roof's Waterprf Membrane** (check box): Check if insulation is installed completely on the outside of the membrane.
- **RefCnt:** The number of times this material is referenced by ConsAssm objects.
- **FrmDpth:** The depth (in inches) of composite layer cavity.
- **SimpleR:** The R-value of the composite layer.
- **R-Value:** The R-value of the material.
- **Thickness:** The thickness of the material.
- **Thermal Cond.:** The thermal conductivity of the material.
- **Specific Heat:** The specific heat of the material.
- **Density**: The density of the material.

Materials Data Screen (Category = Composite)

To access this screen, expand **Materials** and double click the **Air – Metal Wall Framing** option (Materials icon). Then in **Category,** select **Composite.**

Note: Selecting *Category = Composite* in the Material Data screen prompts you to add additional inputs (red box below) describing the framing configuration and cavity insulation.



Input summary for Materials Data Composite screen (red box):

Framing section:

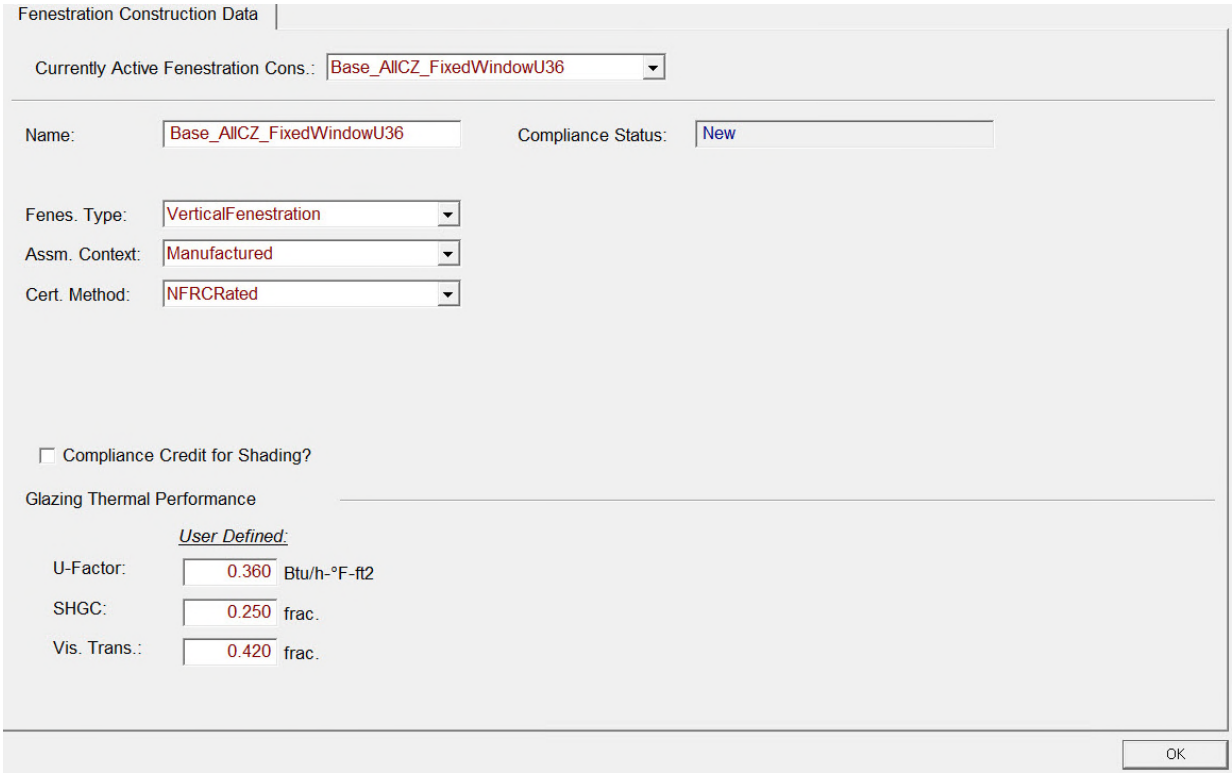
- **Material:** The material used to construct the frame. Options are wood and metal.
- **Configuration:** The configuration used to construct the frame.
- **Depth**: The depth of the framing.
- **Cavity Ins R-Val:** The nominal R-value of composite layer cavity insulation.
- **Notes**: A space to leave detailed information about the framing material and construction.

Framing Factors section

- **Cavity**: Fraction of cavity in the composite layer.
- **Frm**: Framing factor (fraction) of framing members.

Fenestration Construction Data Screen

To access this screen, under Project name expand **FenestrationConstructions** and double click the **FixedWindow** option (Fenestration Constructions icon).



Input summary for **Fenestration Construction Data**:

- **Currently Active Fenestration Cons.:** The name of the currently selected fenestration construction.
- **Name**: The name of the Fenestration Construction.
- **Compliance Status:** The compliance status of the window.
- **Fenes. Type**: Select the fenestration type. Options are VerticalFenestration and Skylight.
- **Assm. Context**: Select whether the fenestration product is Manufactured, Site Built or Field Fabricated.
- **Cert. Method**: Select whether the fenestration construction represents an actual National Fenestration Rating Council (NFRC)-rated product (i.e., uses Center of Glass values via the Nonresidential Appendix 6 [NA-6] equation method), or is based on T-24 Default Assumptions.
- **Compliance Credit for Shading? (check box):** Select to indicate if any fenestration in the building is taking compliance credit for shading.

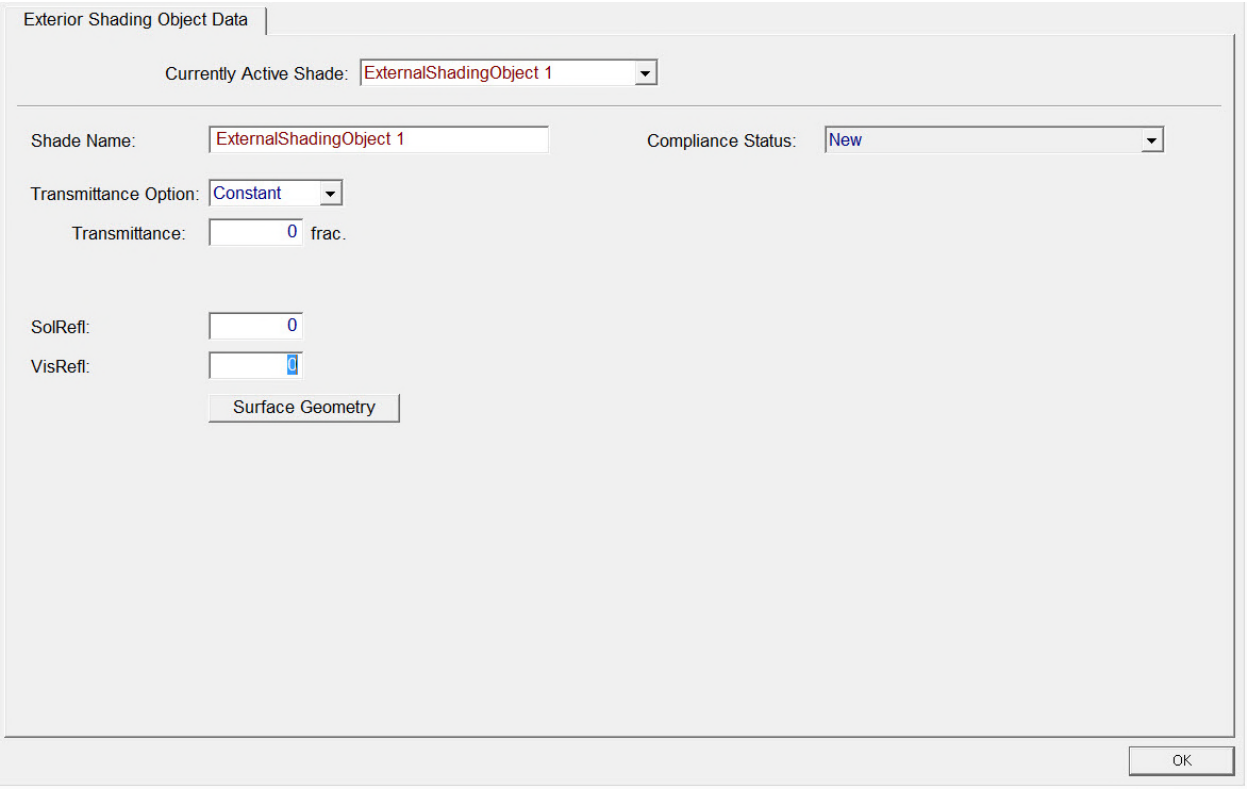
Glazing Thermal Performance section *User Defined*

- **U-Factor**: The simulated overall U-factor for the fenestration product, including the glazing and the frame.
- **SHGC:** The simulated overall SHGC for the fenestration product, including the glazing and the frame.

- **Vis. Trans**.: The simulated overall visible transmittance of the fenestration product, including the glazing and the frame.

Exterior Shading Object Data Screen

To access this screen, right click on Building and scroll down to **Create.** Click **ExternalShadingObject.** Make selections in the **Create ExternalShadingObject** dialog box and click **OK.**



Input summary for **Exterior Shading Object Data** screen:

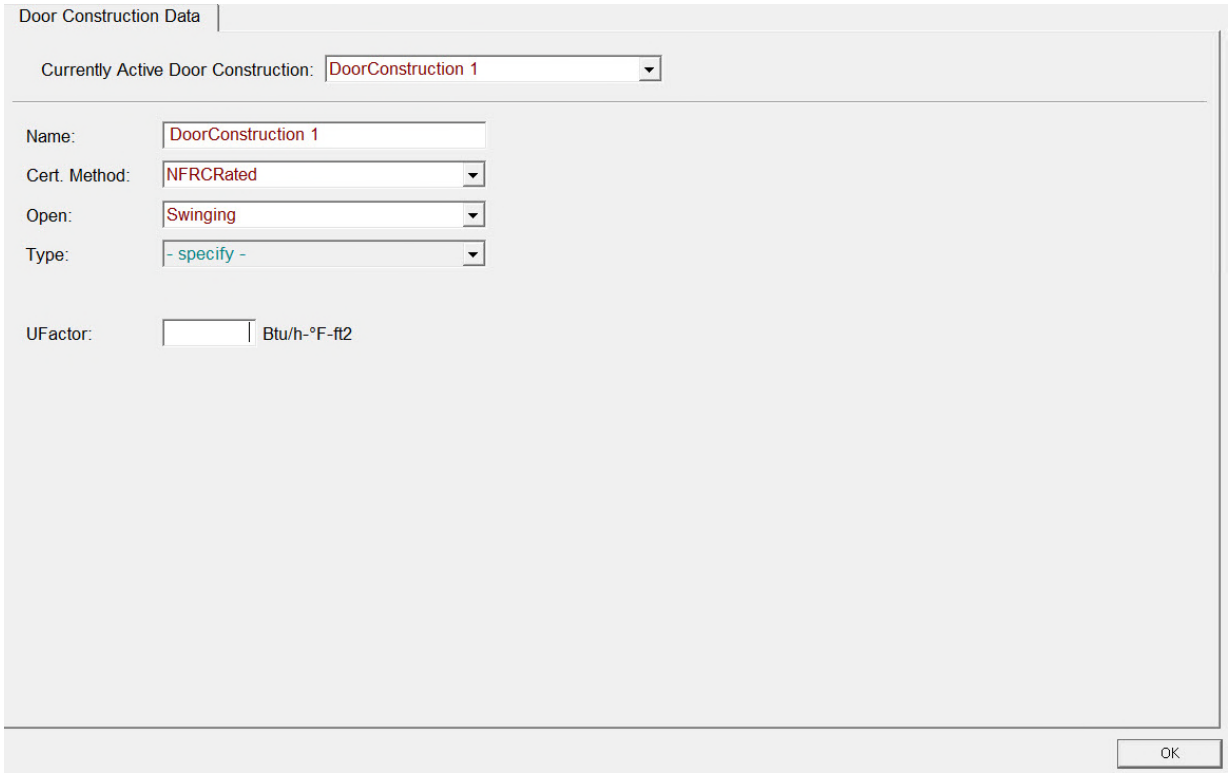
- **Currently Active Shade**: The name of the currently selected shade.
- **Compliance Status**: The compliance status of the exterior shade.
- **Shade Name**: The name or description used to identify the shade.
- **Transmittance Option**: Select the schedule when the shade is in operation.
- **Transmittance (frac.)**: The transmittance of the shade (input is optional).
- **Trans Schedule**: Select schedule, or create/import Fraction Schedule (and apply only here).
- **SolRefl**: The fraction of solar energy reflected by the shade.
- **VisRefl:** The fraction of visible light reflected by the shade.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Door Construction Data Screen

To access this screen, under Project name right click on **DoorConstructions** and scroll down to **Create**. Then click **DoorConstruction**. Make selections in the **Create DoorConstruction** dialog box, and click **OK.**

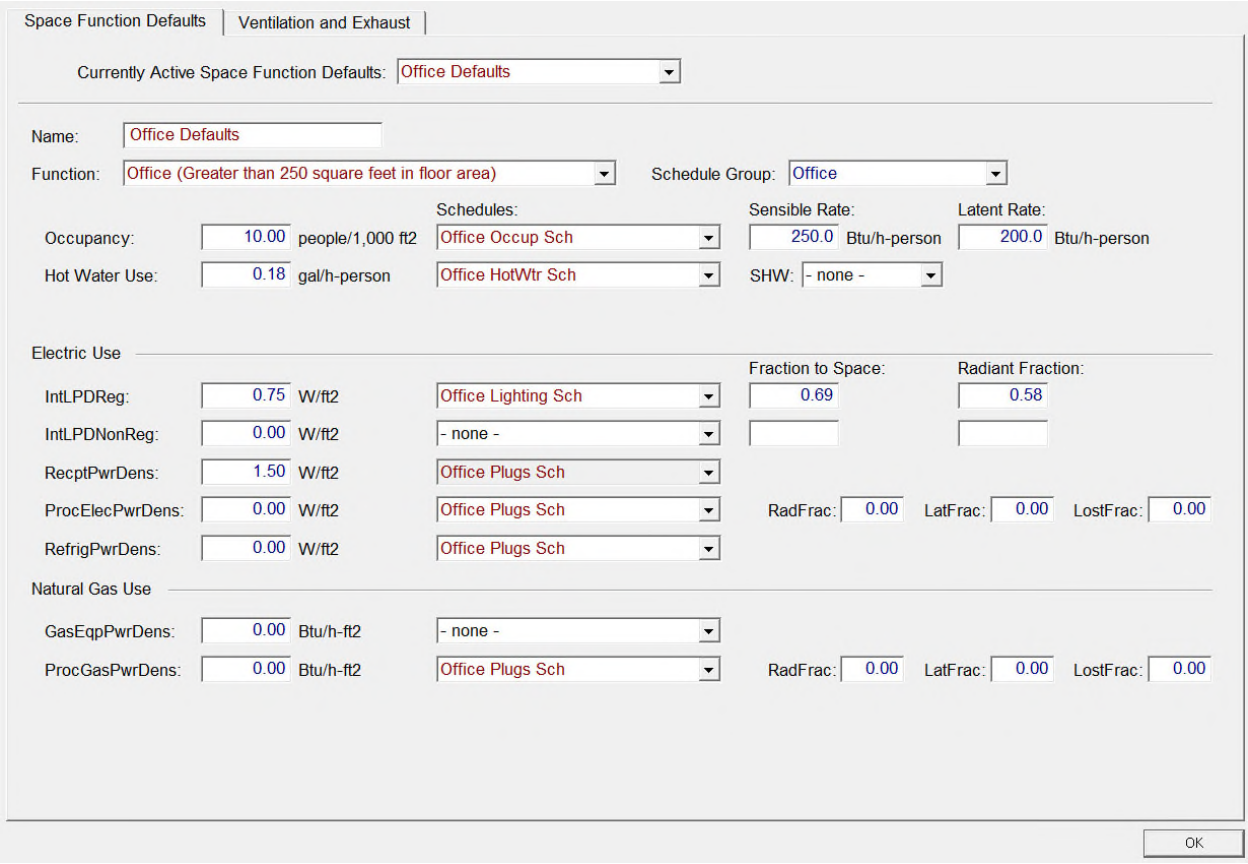


Input summary for **Door Construction Data**:

- **Currently Active Door Construction**: The name of the currently selected door construction.
- **Name:** The name or description used to identify the door construction.
- **Cert. Method:** Select the Certification Method. Options are DefaultPerformance or NRFCRated.
- **Open:** Select the exterior door operation. Options are Swinging and NonSwinging.
- **Type:** The type of door. Types are InsulatedSingleLayerSectionalMetal, InsulatedSwingingMetal, UninsulatedDoubleLayerMetal, UninsulatedSingleLayerMetal, UninsulatedSingleLayerRollupMetal, WoodOther, and WoodThick.
- **UFactor**: The rate of heat transfer of the door. For CEC Default method, this value gets automatically populated depending on user selections for Open and Type fields. (User input required for NFRC-rated method.)

Space Function Defaults Data Screen (Space Function Defaults Tab)

To access this screen, under Project name expand **SpaceFunctionDefaults** (Space Function Defaults icon) and double click **Office Defaults.**


Space Function Defaults
Ventilation and Exhaust
Currently Active Space Function Defaults: Office Defaults
Name: Office Defaults
Function: Office (Greater than 250 square feet in floor area)
Schedule Group: Office
Schedules:
Sensible Rate:
Latent Rate:
Occupancy: 10.00 people/1,000 ft2 Office Occup Sch 250.0 Btu/h-person 200.0 Btu/h-person
Hot Water Use: 0.18 gal/h-person Office HotWtr Sch SHW: - none -
Electric Use
Fraction to Space:
Radiant Fraction:
IntLPDReg: 0.75 W/ft2 Office Lighting Sch 0.69 0.58
IntLPDNonReg: 0.00 W/ft2 - none -
RecptPwrDens: 1.50 W/ft2 Office Plugs Sch
ProcElecPwrDens: 0.00 W/ft2 Office Plugs Sch RadFrac: 0.00 LatFrac: 0.00 LostFrac: 0.00
RefrigPwrDens: 0.00 W/ft2 Office Plugs Sch
Natural Gas Use
GasEqpPwrDens: 0.00 Btu/h-ft2 - none -
ProcGasPwrDens: 0.00 Btu/h-ft2 Office Plugs Sch RadFrac: 0.00 LatFrac: 0.00 LostFrac: 0.00
OK

Input summary for **Space Function Defaults** tab:

- **Currently Active Space Function Defaults**: Select the name of the active Space Function Defaults, or select create new SpaceFunctionDefaults.
- **Name:** The name of the Space Function Defaults.
- **Function:** Select the area category occupancy type from Nonresidential Appendix 5.4A.
- **Schedule Group:** Select a type of occupancy category used to determine schedules.
- **Occupancy:** The people per area in the space.
- **Hot Water Use:** The rate of domestic hot water used per person.
- **Schedules** (Occupancy): Select a schedule that describes the fraction of occupancy on an hourly basis.
- **Schedules** (Hot Water Use): Select a schedule that describes the fraction of hot water use on an hourly basis.
- **Sensible Rate** (Btu/h-person): The rate of sensible heat released per person, which is a function of activity.
- **Latent Rate** (Btu/h-person)**:** The rate of latent heat released per person, which is a function of activity.
- **SHW**: Select the service hot water loop coming into the space, or create/import the FluidSegment.

Electric Use section

- **IntPDReg**: Total regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Schedules** (IntPDReg): Select a schedule that describes the fraction of lighting use on an hourly basis.
- **Fraction to Space** (IntPDReg)**:** Fraction of regulated interior lighting heat gain going to space air.
- **Radiant Fraction** (IntPDReg)**:** Fraction of regulated interior lighting radiant heat gain going to space surfaces.
- **IntPDNonReg:** Total non-regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Schedules** (IntPDNonReg): Select a schedule that describes the fraction of lighting use on an hourly basis.
- **Fraction to Space** (IntPDNonReg): Fraction of non-regulated interior lighting heat gain going to space air.
- **Radiant Fraction** (IntPDNonReg): Fraction of non-regulated interior lighting radiant heat gain going to space surfaces.
- **RecptPwrDens:** The usage of electrical devices plugged into receptacles in a space based on the occupancy type.
- **Schedules** (RecptPwrDens): Select a schedule that describes the fraction of receptacle use on an hourly basis.
- **ProcElecPwrDens**: Process electrical power density resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include sensible and/or latent components. For data centers this includes transformers, UPS, PDU, server fans, power supplies, etc.
- **Schedules** (ProcElecPwrDens): Select a schedule that describes the fraction of receptacle use on an hourly basis.
- **RadFrac** (ProcElecPwrDens): The fraction of radiant heat gain to a space based on appliance energy use.
- **LatFrac** (ProcElecPwrDens)**:** The fraction of latent heat gain to a space based on appliance energy use.
- **LostFrac** (ProcElecPwrDens): The fraction of heat lost to the exterior is based on appliance energy use.
- **RefrigPwrDens:** The amount of power supplied to a unit area for refrigeration.
- **Schedules** (RefrigPwrDens): Select a schedule that describes the fraction of refrigeration use on an hourly basis.

Natural Gas Use section

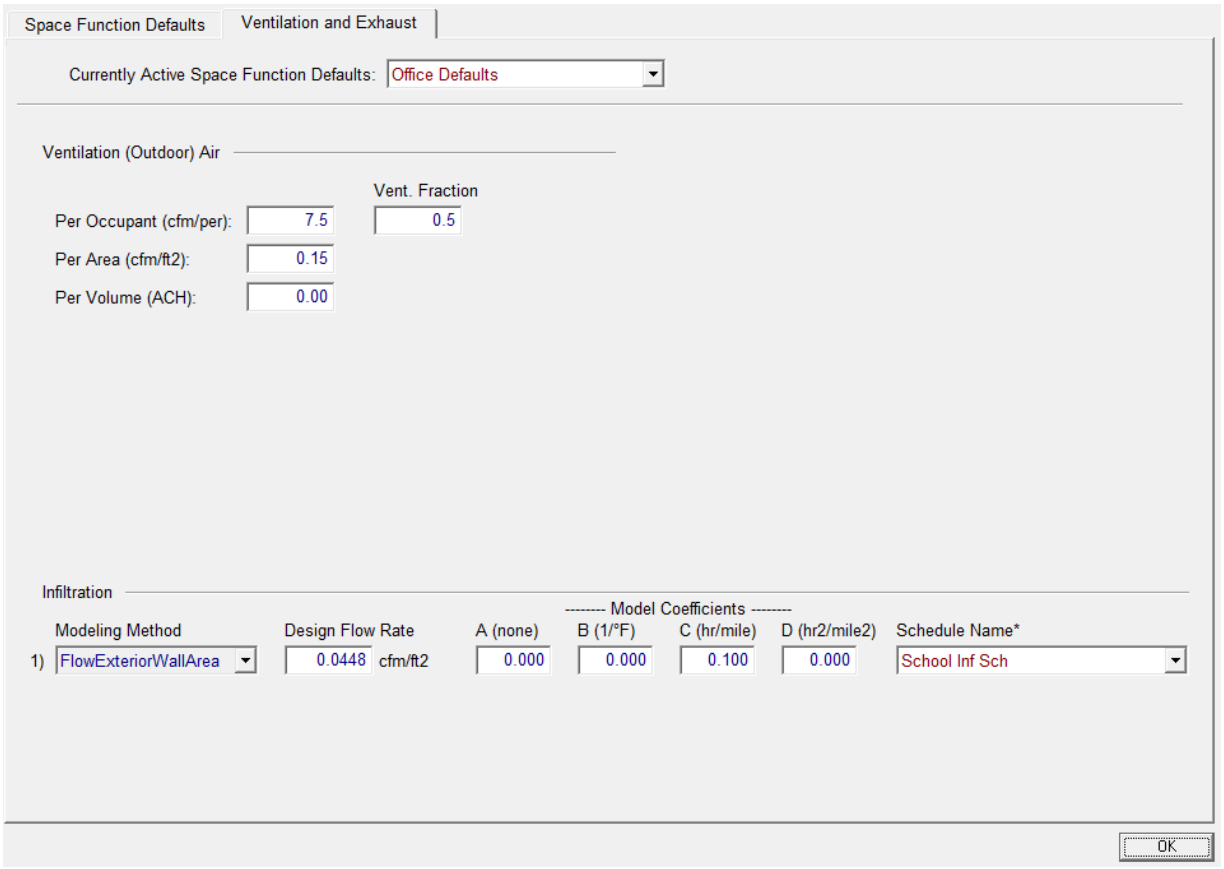
- **GasEqpPwrDens**: Commercial gas power density is the average power density for all commercial gas equipment, assuming constant year-round operation.
- **Schedules** (GasEqpPwrDens): Select a schedule that describes the fraction of gas equipment use on an hourly basis.
- **ProcGasPwrDens:** Process load is the gas energy consumption in the conditioned space of a building resulting from an activity or treatment not related to the space conditioning,

lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.

- **Schedules** (ProcGasPwrDens): Select a schedule that describes the fraction of process gas equipment use on an hourly basis.
- **RadFrac** (ProcGasPwrDens): The fraction of radiant heat gain to a space based on appliance energy use.
- **LatFrac** (ProcGasPwrDens)**:** The fraction of latent heat gain to a space based on appliance energy use.
- **LostFrac** (ProcGasPwrDens): The fraction of heat lost to the exterior is based on appliance energy use.

Space Function Defaults Data Screen (Space Function Defaults Tab)

To access this screen, under Project name expand **SpaceFunctionDefaults** (Space Function Defaults icon), double click **Office Defaults**, and then click on the **Ventilation and Exhaust** tab**.**



Input summary for **Ventilation and Exhaust** tab:

Ventilation (Outdoor) Air section

- **Per Occupancy (cfm/per)**: The design outside air flow rate divided by the design occupancy of the space.
- **Vent. Fraction:** The fraction of design occupancy that is assumed for calculating the minimum design ventilation rate for compliance analysis.

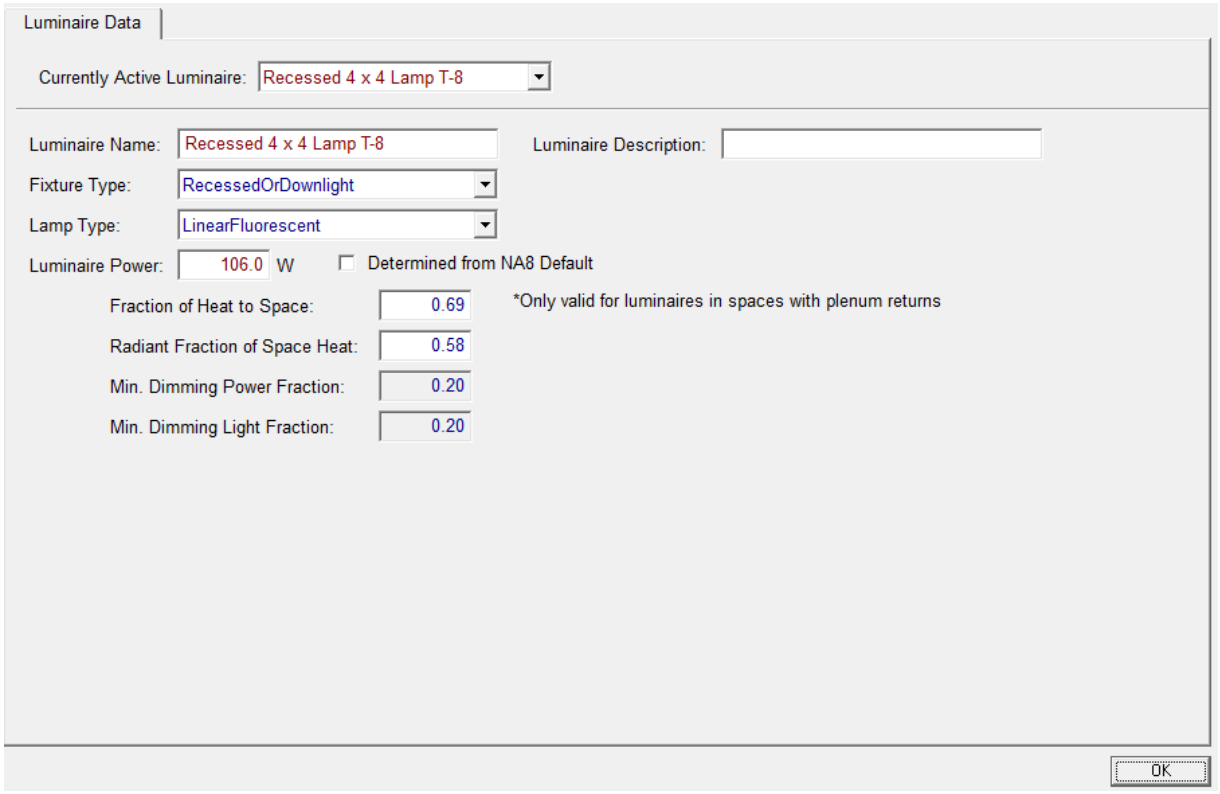
- **Per Area (cfm/ft2)**: The design outside air flow rate divided by the floor area of the space.
- **Per Volume (ACH):** The design outside air changes per hour.

Infiltration section

- **Modeling Method**: Method used for modeling uncontrolled air leakage or infiltration. Options include FlowZone, FlowArea, FlowExteriorArea, FlowExteriorWallArea, and AirChangesPerHour.
- **Design Flow Rate**: The infiltration rate specified as cfm/ft² of exterior wall area at a wind speed of 10 mph and an infiltration schedule value of 1. The default value of 0.0448 cfm/ft² must be used unless specific air sealing methods beyond requirements of the standard are applied and documented.
- **Model Coefficients A:** Infiltration overall coefficient.
- **Model Coefficients B:** Infiltration temperature coefficient.
- **Model Coefficients C**: Infiltration windspeed coefficient.
- **Model Coefficients D**: Infiltration windspeed squared coefficient.
- **Schedule Name:** Select an infiltration schedule. (Input is optional.)

Luminaires Data Screen

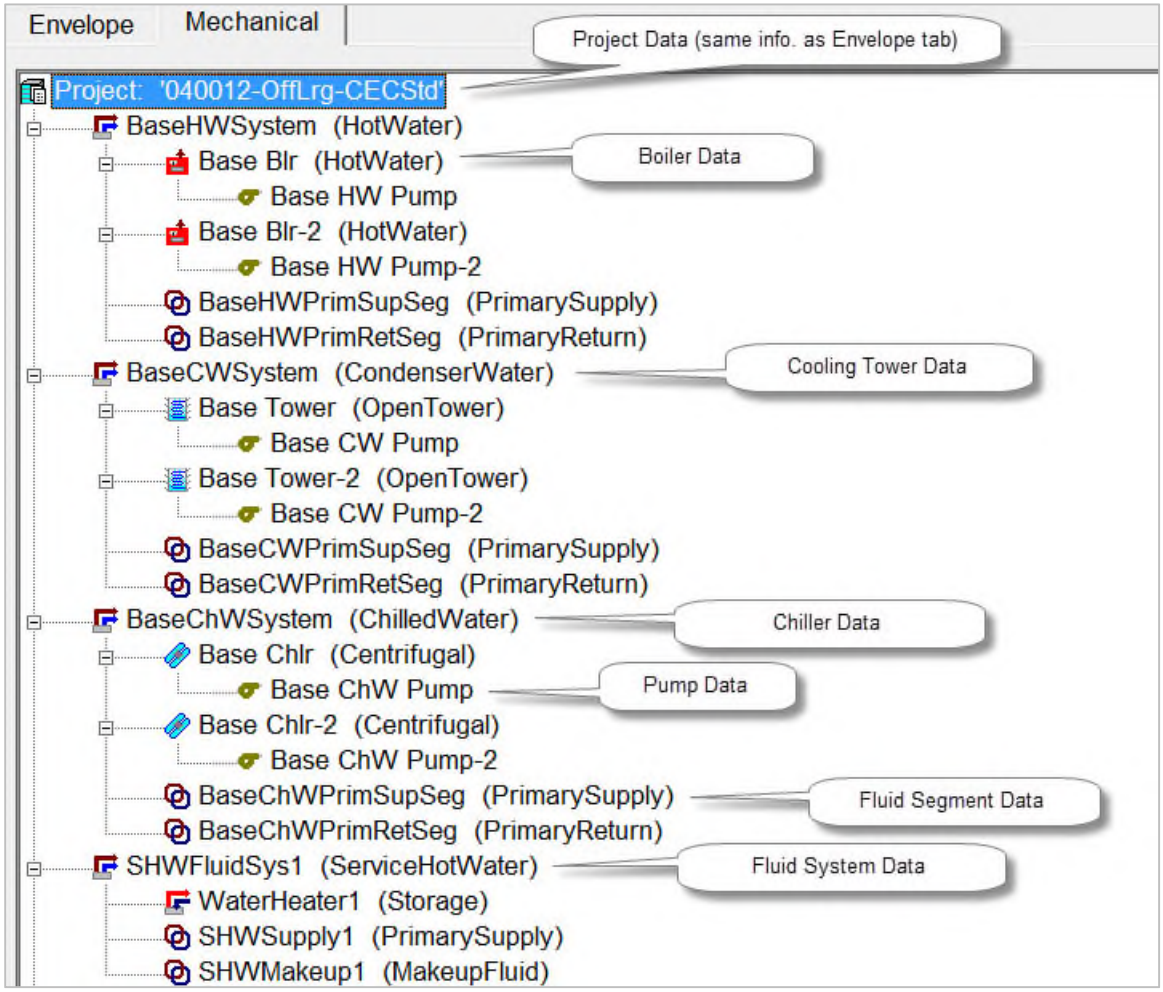
To access this screen, under the Project name expand **Luminaires** (Luminaires icon) and double click the **Recessed** option.


Luminaire Data
Currently Active Luminaire: Recessed 4 x 4 Lamp T-8
Luminaire Name: Recessed 4 x 4 Lamp T-8
Luminaire Description:
Fixture Type: RecessedOrDownlight
Lamp Type: LinearFluorescent
Luminaire Power: 106.0 W
Determined from NA8 Default
Fraction of Heat to Space: 0.69
*Only valid for luminaires in spaces with plenum returns
Radiant Fraction of Space Heat: 0.58
Min. Dimming Power Fraction: 0.20
Min. Dimming Light Fraction: 0.20
OK

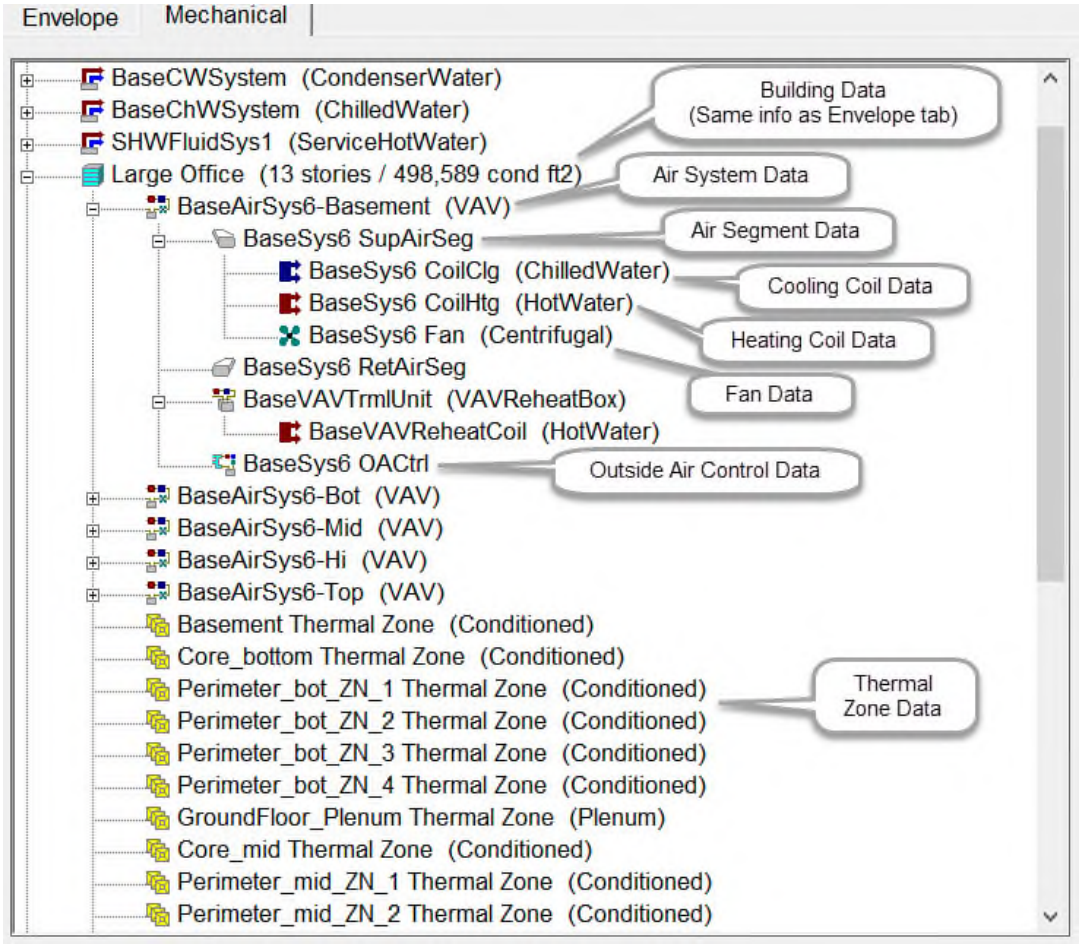
Input summary for **Luminaire Data** tab:

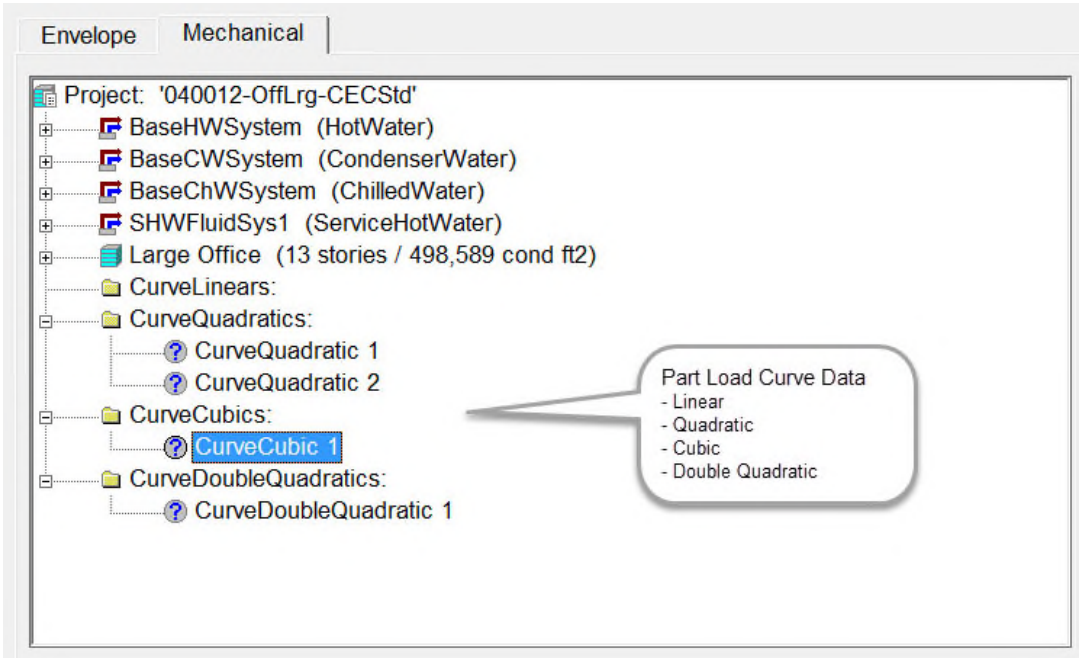
- **Currently Active Luminaire**: The name of the currently selected luminaire. Options are Recessed 4’ by 4 Lamp T-8, Chalkboard Track Luminaire, and Stage Lighting.
- **Luminaire Name**: The name of the luminaire.
- **Fixture Type:** Select the Luminaire’s fixture type. Options are RecessedWithLens, RecessedOrDownlight, NotInCeiling.
- **Lamp Type:** Select the lamp type used in the luminaire. Options are LinearFluorescent, CFL, Incandescent, LED, MetalHalide, MercuryVapor, HighPressureSodium.
- **Luminaire Power**: Luminaire power, the connected power for a luminaire including lamp and ballast.
- **Determined from NA8 Default (check box)**: Select for lamp power determined from NA8 defaults.
- **Fraction of Heat to Space**: Fraction of luminaire heat gain going to space air.
- **Radiant Fraction of Space Heat**: Fraction of luminaire radiant heat gain going to space surfaces.
- **Min**. **Dimming Power Fraction:** The minimum power fraction when controlled lighting is fully dimmed.
- **Min**. **Dimming Light Fraction:** The minimum light output of controlled lighting when fully dimmed.

Organization of the Mechanical Tab



Organization of the Mechanical Tab (continued)





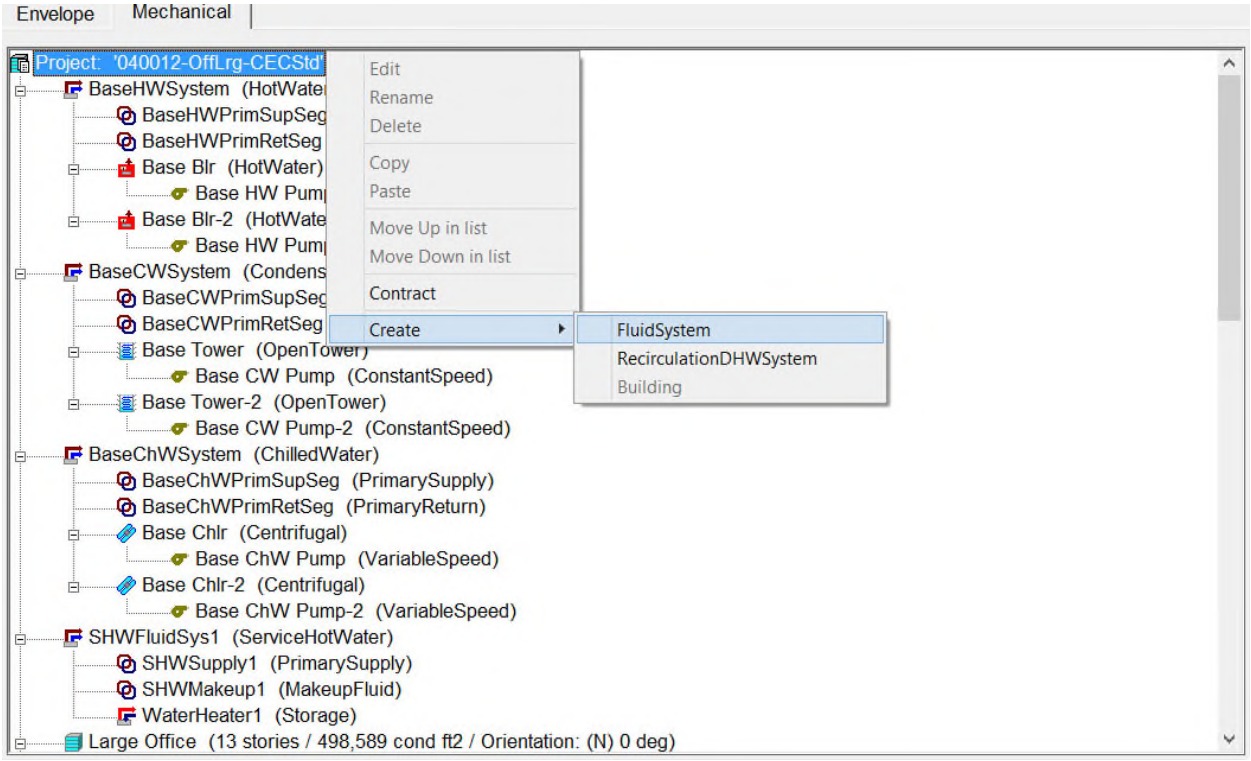
Mechanical Input Screen Details

Project Data Screen

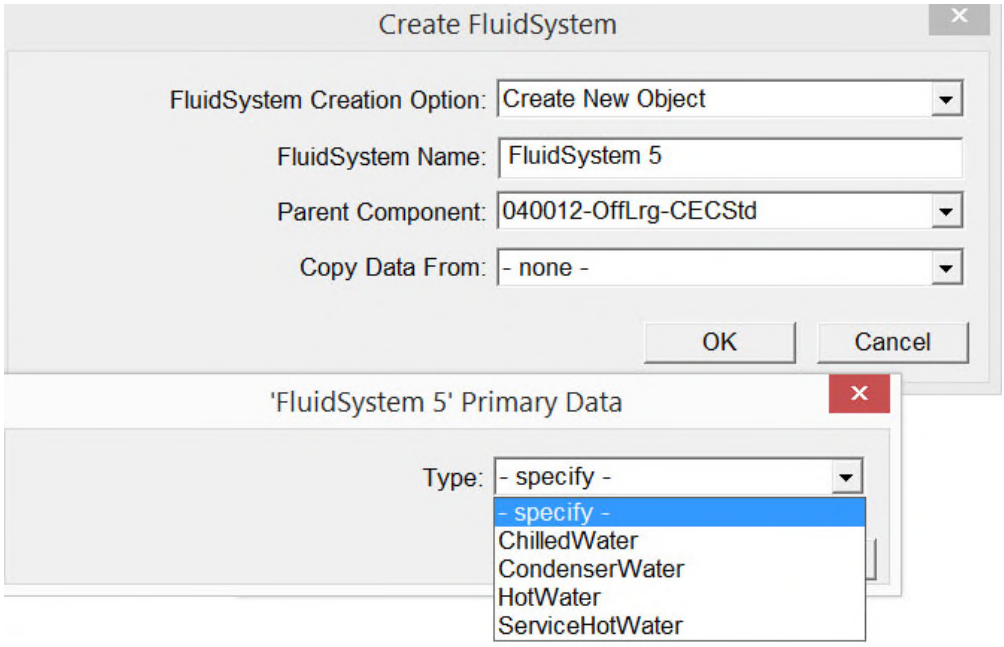
Note that the Project Data input screen is identical to that described above in the Envelope Input Screen Details. Users may edit Project Data on either the Envelope or Mechanical tab of the user interface and that data will persist on both tabs.

Fluid System Data Screen (New)

The following types of Fluid Systems can be created: Chilled Water, Condenser Water, Hot Water, and Service Hot Water. To create a new Fluid System, in the Mechanical tab right click on Project, scroll down to **Create**, and select **FluidSystem.**

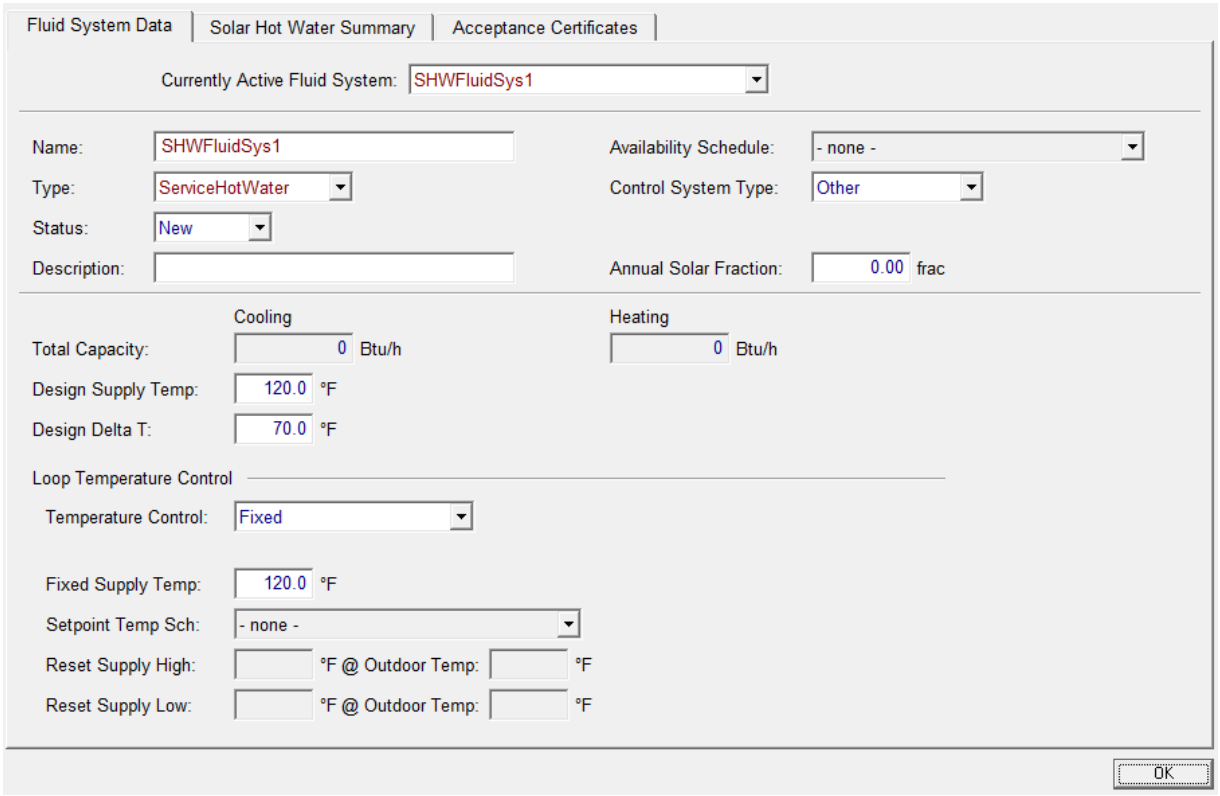


The Create FluidSystem dialog box appears. Make selections and click **OK**. The FluidSystem Primary Data dialog box appears. Make a selection and click **OK**.



Fluid System Data Screen (Existing)

To access an existing Fluid System Data screen, double click a fluid system option (Fluid System icon).



Input Summary:

- **Currently Active Fluid System:** Name of the currently selected fluid system.
- **Name**: The name of the fluid system.
- **Type**: Select the type of fluid system. Options are ChilledWater, CondensedWater, HotWater, and ServiceHotWater. Type is used to validate the connections between various FluidSys objects.
- **Status**: Defines system as New, Existing, or Altered.
- **Description**: A brief description of the fluid system that summarizes its essential characteristics.
- **Availability Schedule**: The name of the schedule that determines when the hot water system is available to provide heating. The system is not necessarily providing heating at all times it is available, but if it is not available, no heating will be provided.
- **Control System Type**: Select the type of control system used for the fluid system. This is used to specify part load curves for variable speed pumps. Options are DDC or other.
- **Annual Solar Fraction**: The fraction provided by a certified solar calculator from Go Solar California.
- **Total Capacity (Cooling):** Reference to the sum of primary equipment cooling capacities.
- **Total Capacity (Heating):** Reference to the sum of primary equipment heating capacities.
- **Design Supply Temp**: The design supply water temperature of the loop.

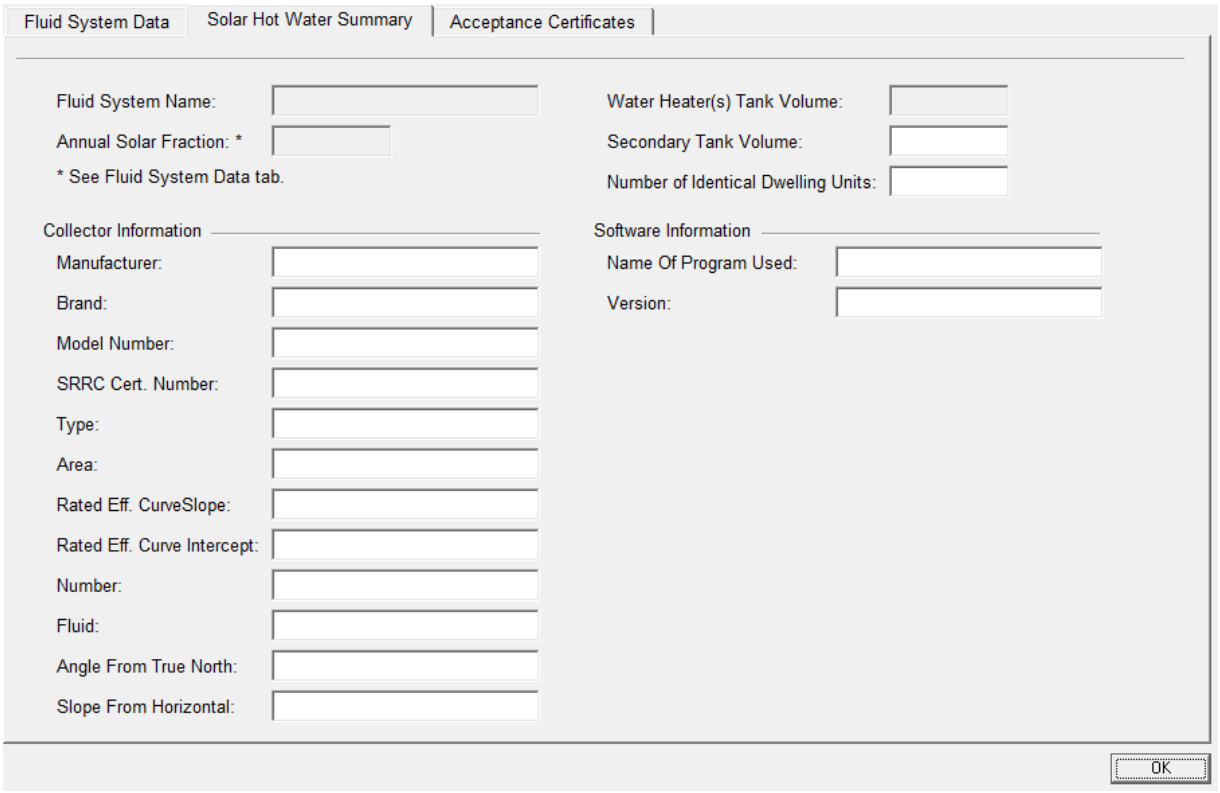
- **Design Delta T**: The design supply water temperature delta T.

Loop Temperature Control section

- **Temperature Control**: The method used to control the chilled water supply temperature. The options are Fixed, Scheduled, OutsideAirReset, WetBulbReset, FixedDualSetpoint, and ScheduledDualSetpoint.
    - Fixed means that a constant temperature setpoint is used.
    - Scheduled means that the temperature is adjusted based on a user specified schedule.
    - OutsideAirReset means that the water supply temperature is adjusted based on the outdoor air temperature.
    - WetBulbReset reset means that the water supply temperature is adjusted based on the cooling load.
- **Fixed Supply Temp (Cooling)**: The supply water temperature setpoint for 'Fixed' temperature control.
- **Fixed Supply Temp (Heating)**: The supply water temperature setpoint for 'Fixed' temperature control.
- **Setpoint Temp Sch (Cooling)**: The scheduled supply water temperature setpoint of fluid system.
- **Setpoint Temp Sch (Heating)**: The scheduled supply water temperature setpoint of fluid system.
- **Reset Supply High**: The maximum (high) reset supply water temperature for Temperature Ctrl = OutsideAirReset or LoadReset.
- **Reset Supply High (deg. F @ Outdoor Temp)**: The outdoor air temperature that corresponds to the maximum (high) reset supply water temperature.
- **Reset Supply Low**: The low supply water temperature used for a reset control. This is the temperature at the high outside air temperature or high cooling load.
- **Reset Supply Low (deg. F @ Outdoor Temp)**: The outdoor air temperature that corresponds to the low supply water temperature used for a reset control.

Fluid System Data Screen (Solar Hot Water Summary Tab)

To access this screen, double click the **Recirculation Water Heating** option (Fluid System icon), and then click on the **Solar Hot Water Summary** tab.

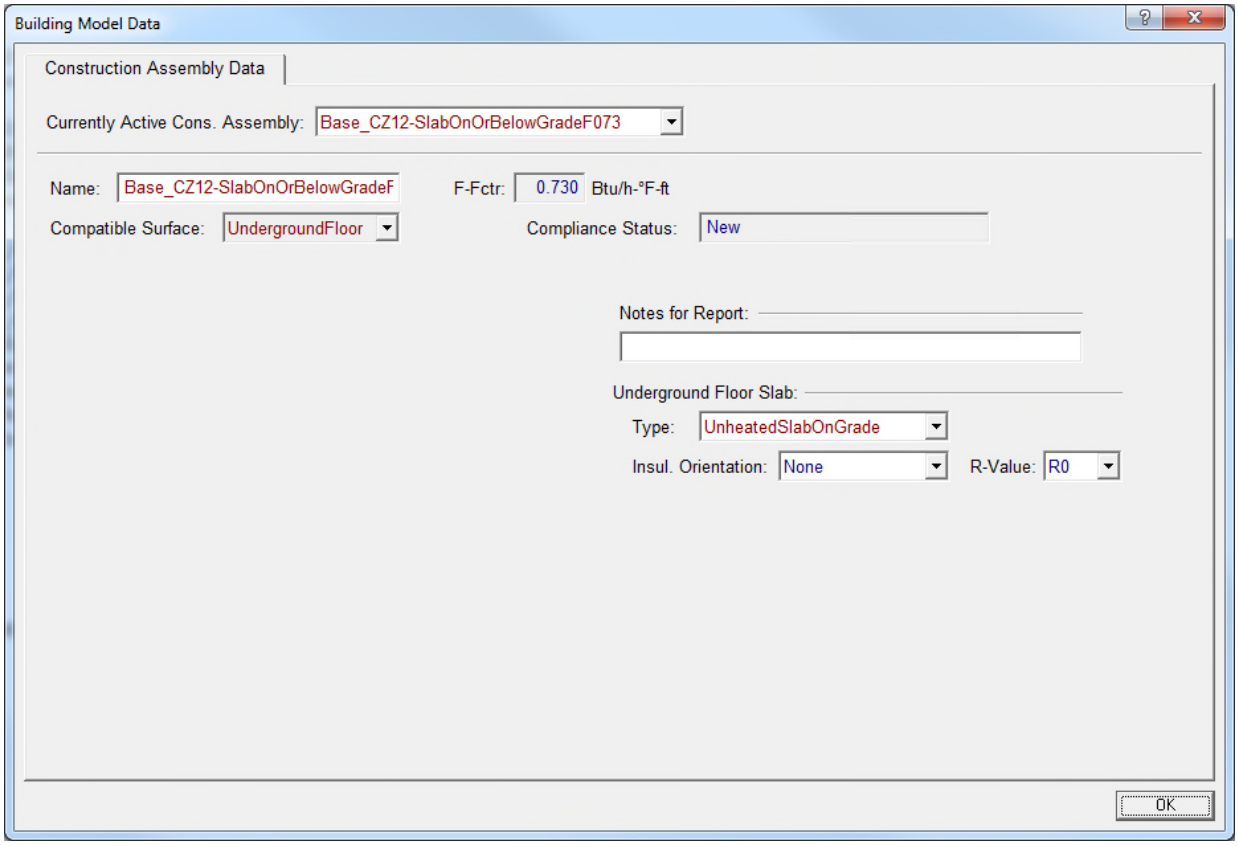


Input Summary:

- **Fluid System Name:** Name of the service hot water fluid system with a solar hot water collector.
- **Annual Solar Fraction:** Solar Fraction value from Fluid System Data Tab.
- **Water Heater(s) Tank Volume:** Storage capacities of all water heaters on the fluid system.
- **Secondary Tank Volume:** Optional input used to populate PRF-01 Table F.
- **Number of Identical Dwelling Units:** Optional input used to populate PRF-01 Table F.
- **Collector Information:** Optional input used to populate PRF-01 Table F.
- **Software Information:** Optional input used to populate PRF-01 Table F.

Fluid System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Acceptance Certificates** tab.

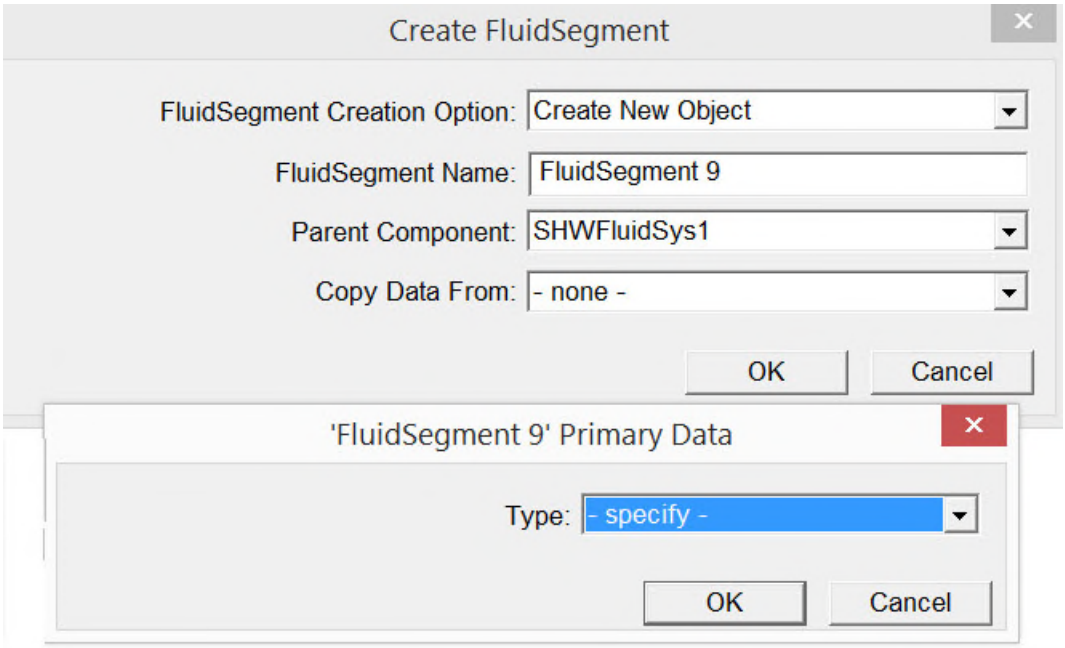


Input Summary:

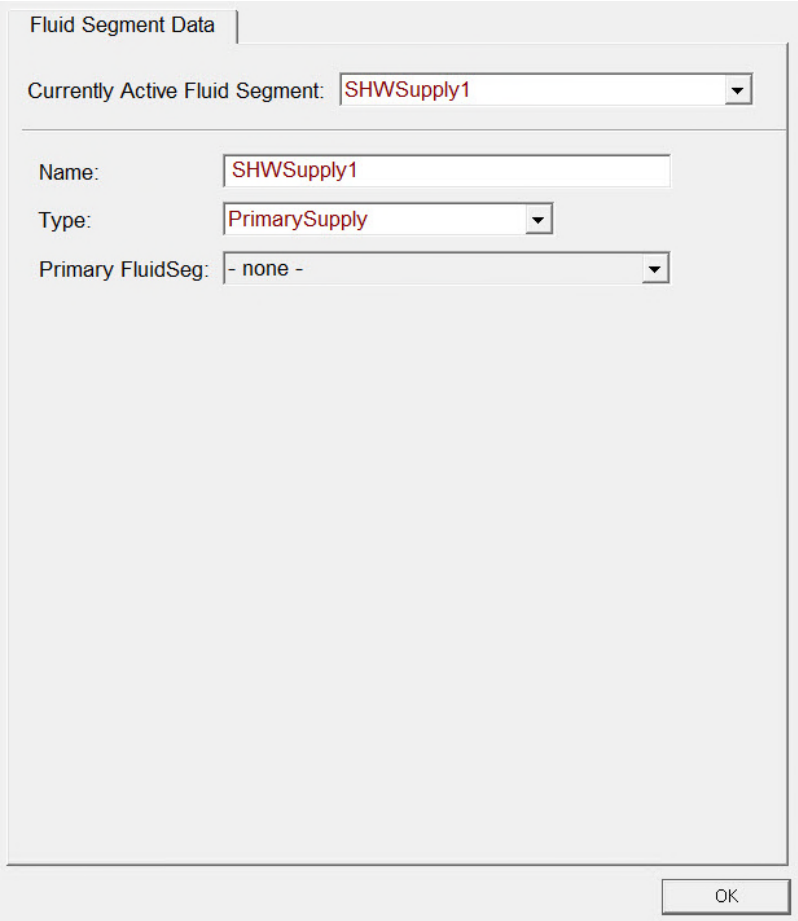
- **Currently Active Fluid System:** The name of the currently selected Air System.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust.
- **Acceptance Certificates:** Check Acceptance Certificates indicating whether an acceptance certificate of the number matching the term name is required (used for reporting).

Fluid Segment Data Screen

To create a new Fluid Segment, in the Mechanical tab right click on Fluid System, scroll down to **Create**, and select **FluidSegment.** The Create FluidSegment dialog box appears. Make selections and click **OK**. The FluidSegment Primary Data dialog box then appears. Make selections and click **OK**. The Fluid Segment Data tab appears (see below).



To access this screen, double click a Fluid Segment (Fluid Segment icon).

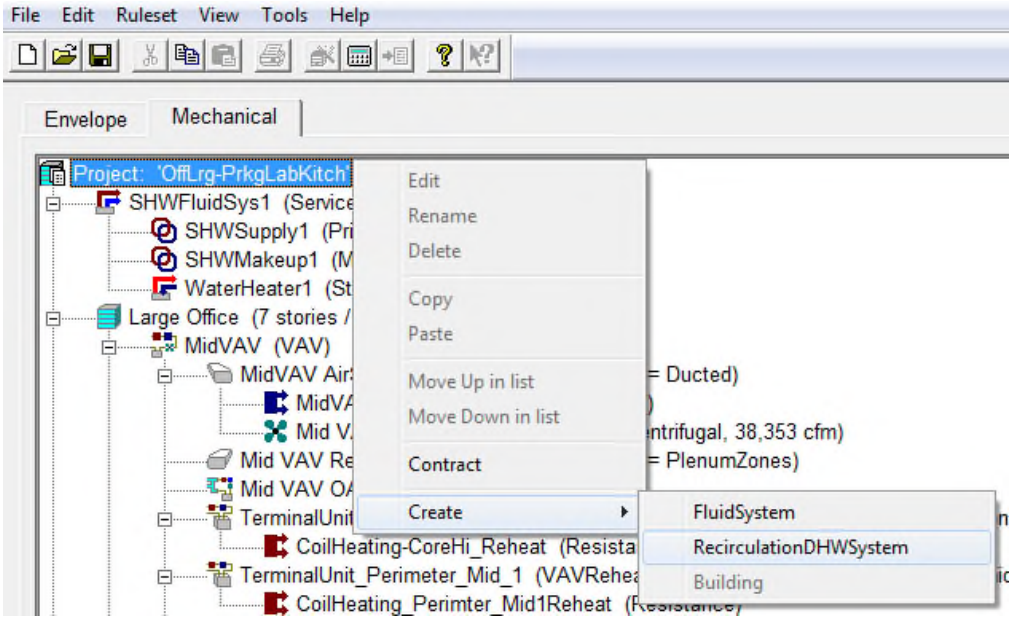


Input Summary:

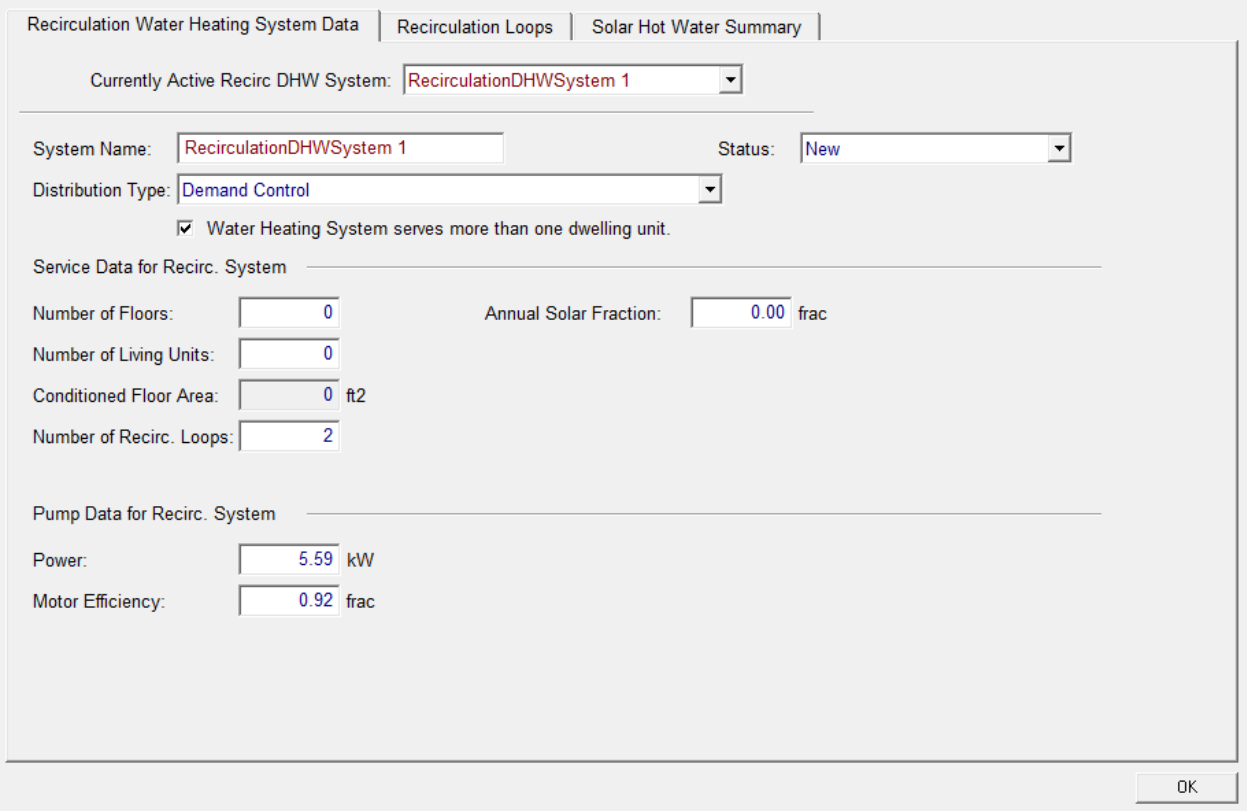
- **Currently Active Fluid Segment:** The name of the currently selected fluid segment.
- **Name**: The name of the fluid segment.
- **Type**: Select the type of fluid segment. This field is used to validate the connections between various FluidSys objects. Options include PrimarySupply, PrimaryReturn, SecondarySupply, SecondaryReturn, MakeupFluid and Connector.
- **Primary FluidSeg**: Refers to the segment that supplies fluid to a secondary segment. Applicable to fluid loops subordinate to the primary loop (secondary, tertiary, etc.), this property is used to define the inlet and outlet of secondary segment.

Recirculation Water Heating System Data Screen (Recirculation Water Heating System Tab)

To create a new Recirculation Water Heating System, in the Mechanical tab right click on Project, scroll down to **Create**, and select **RecirculationDHWSystem.** The Create RecirculationDHWSystem dialog box appears. Make selections and click **OK**. The Recirculation Water Heating System Data screen appears (see below).



To access the Recirculation Water Heating System Data screen, double click the **Recirculation Water Heating** option (Fluid System icon).


Recirculation Water Heating System Data
Recirculation Loops
Solar Hot Water Summary
Currently Active Recirc DHW System: RecirculationDHWSystem 1
System Name: RecirculationDHWSystem 1
Status: New
Distribution Type: Demand Control
Water Heating System serves more than one dwelling unit.
Service Data for Recirc. System
Number of Floors: 0
Annual Solar Fraction: 0.00 frac
Number of Living Units: 0
Conditioned Floor Area: 0 ft2
Number of Recirc. Loops: 2
Pump Data for Recirc. System
Power: 5.59 kW
Motor Efficiency: 0.92 frac
OK

Input Summary:

- **Currently Active Recirc DHW System:** Name of the currently selected recirculation water heating system.
- **System Name:** The name of the recirculation water heating system.
- **Status:** The status of the system or component used for additions and alterations. Options are New, Existing, and Altered.
- **Distribution Type:** The type of recirculation water heating system. Options are No Control, Demand Control, Temperature Modulation, and Temperature Modulation and Monitoring.
- **Water Heating System serves more than one dwelling unit (check box):** Check for water heating system serving more than one dwelling unit.

Service Data for Recirc. System section

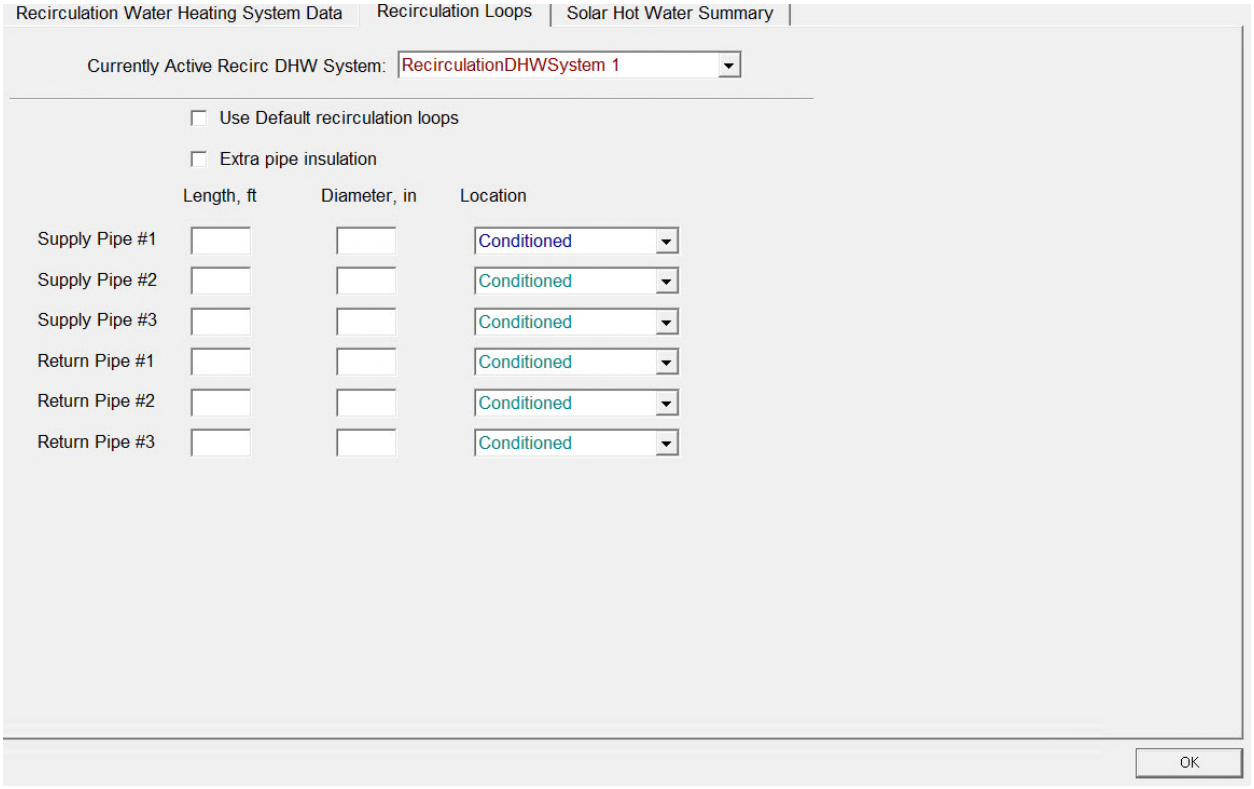
- **Number of Floors:** The number of floors served by the system.
- **Number of Living Units:** The number of living units served by the system.
- **Conditioned Floor Area:** The conditioned floor area served by the system.
- **Number of Recirc. Loops:** The number of recirculation loops served by the system.

Pump Data for Recirc. System section

- **Brake Horsepower:** The recirculation pump power.
- **Pump Efficiency:** The recirculation pump efficiency.

Recirculation Water Heating System Data Screen (Recirculation Loops Tab)

To access this screen, double click the **Recirculation Water Heating** option (Fluid System icon), and then click on the **Recirculation Loops** tab.

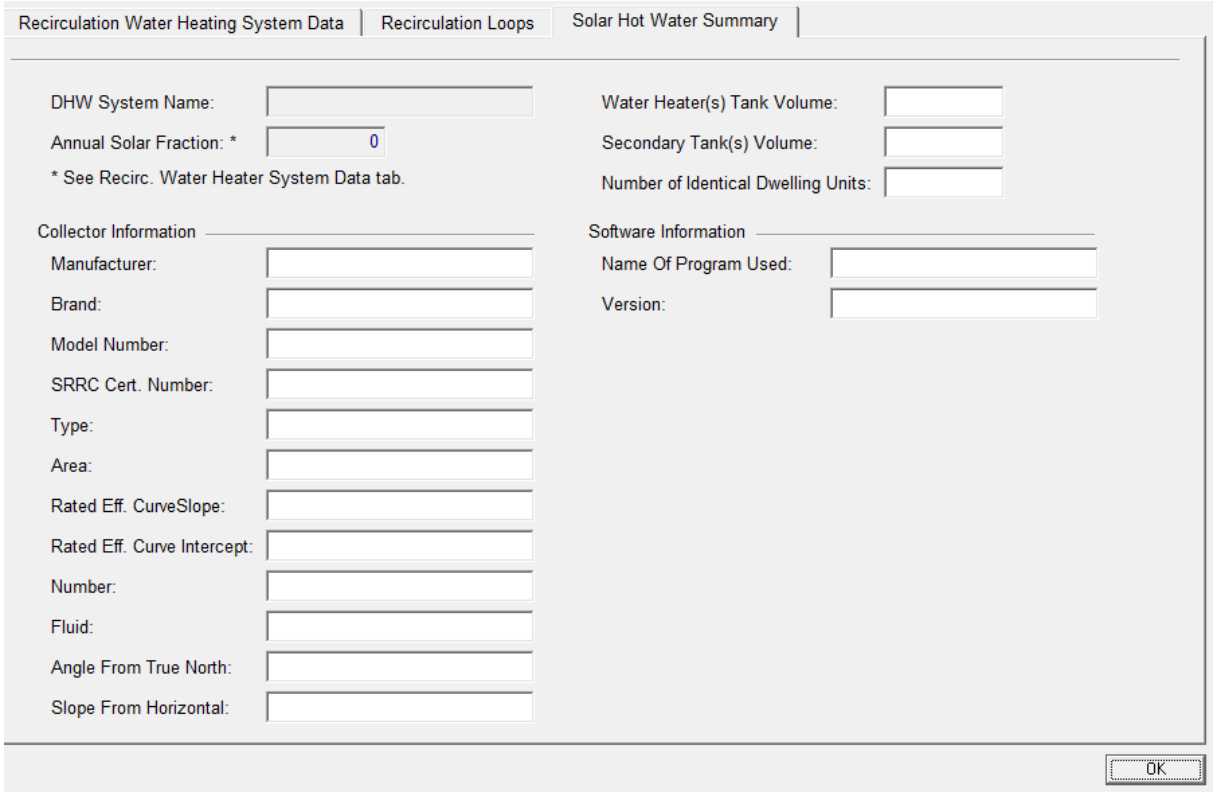


Input Summary:

- **Currently Active Recirc DHW System:** Name of the currently selected recirculation water heating system.
- **Use Default recirculation loops (check box):** Check box to use default recirculation loops.
- **Extra pipe insulation (check box):** Check box to indicate extra pipe insulation (HERS required).
- **Supply Pipe #1–3:** Enter supply pipe length, diameter, and location. (Input is optional.)
- **Return Pipe #1–3:** Enter return pip length, diameter, and location. (Input is optional.)

Recirculation Water Heating System Data Screen (Solar Hot Water Summary Tab)

To access this screen, double click the **Recirculation Water Heating** option (Fluid System icon), and then click on the **Solar Hot Water Summary** tab.



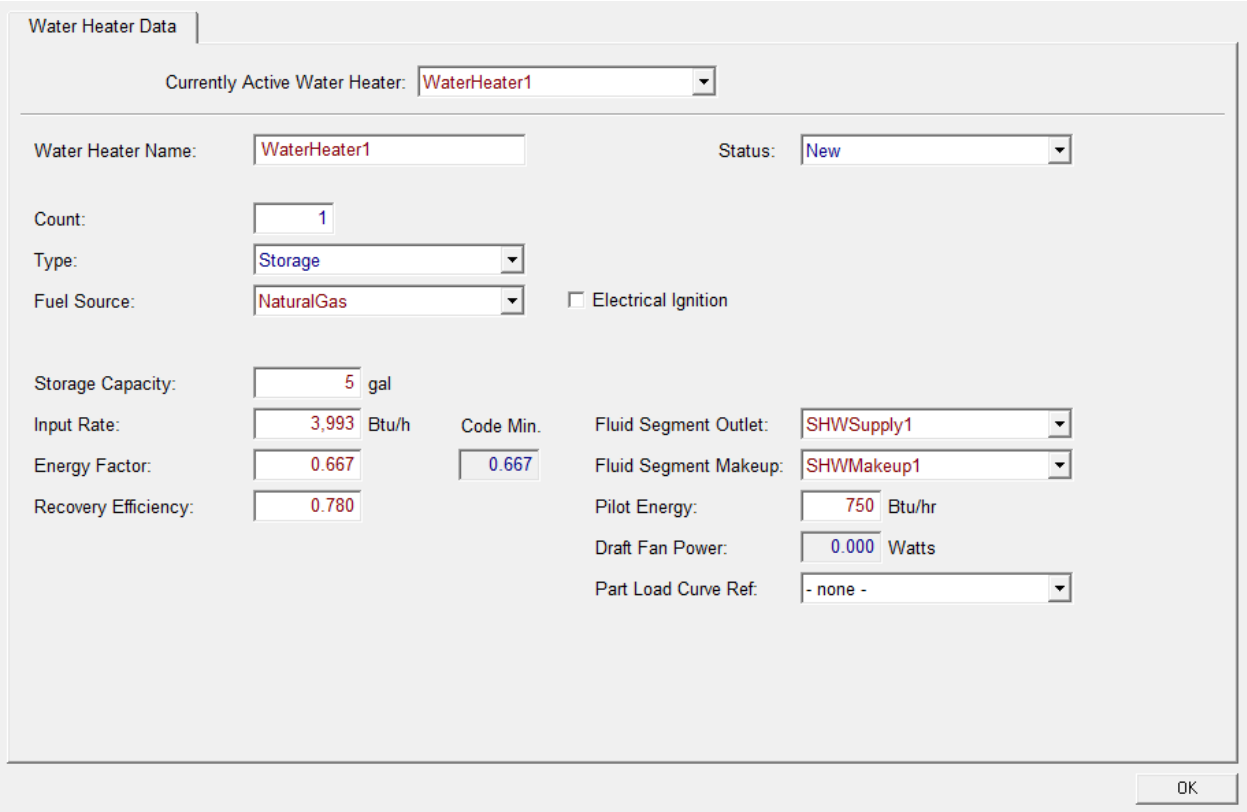
Input Summary:

- **DHW System Name:** Name of the service hot water fluid system with a solar hot water collector.
- **Annual Solar Fraction*:** Solar Fraction value from Fluid System Data Tab.
- **Water Heater(s) Tank Volume:** Storage capacities of all water heaters on the fluid system.
- **Secondary Tank Volume:** Optional input used to populate PRF-01 Table F.
- **Number of Identical Dwelling Units:** Optional input used to populate PRF-01 Table F.
- **Collector Information:** Optional input used to populate PRF-01 Table F.
- **Software Information:** Optional input used to populate PRF-01 Table F.

Water Heater Data Screen

To create a new Water Heater, right click on FluidSystem (Service Hot Water or Recirculation DHW System), scroll down to Create, and then select **WaterHeater.**

To access an existing Water Heater, under Fluid System double click WaterHeater (Fluid System icon).



Input Summary:

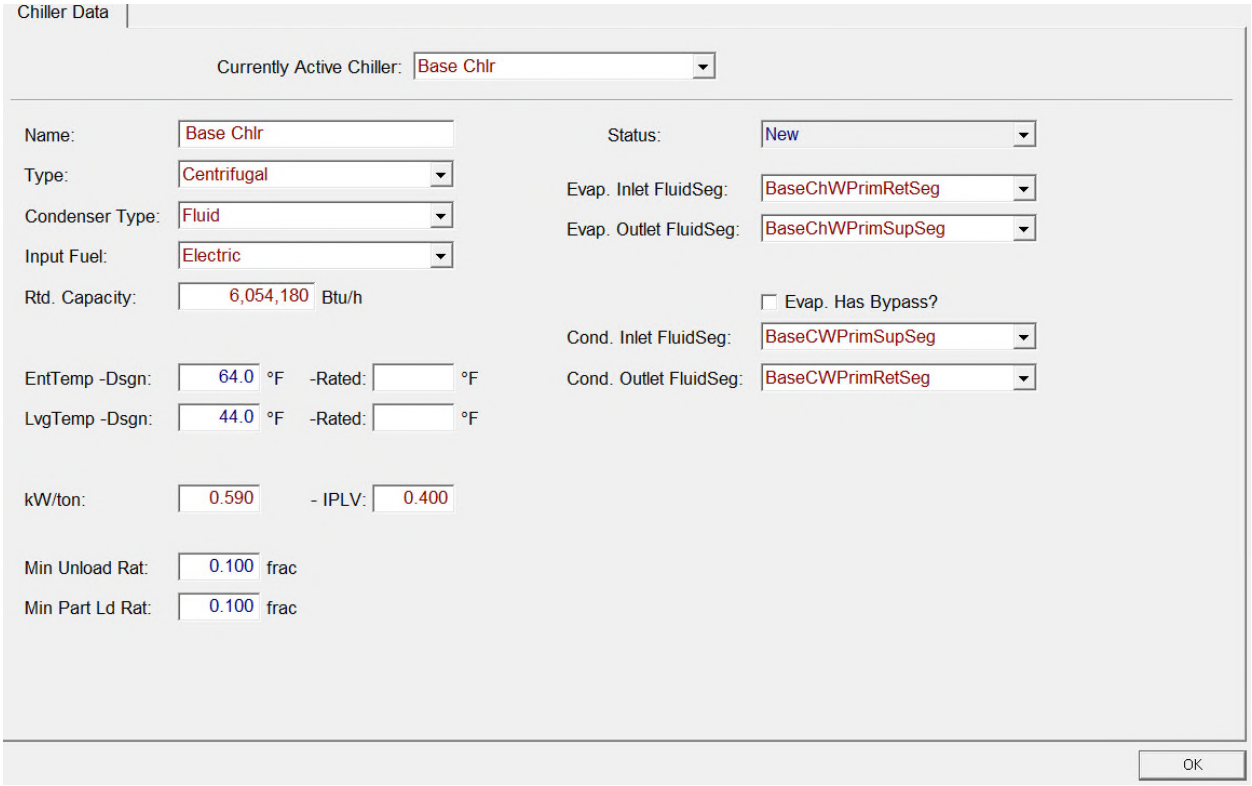
- **Currently Active Water Heater:** Name of the currently selected water heater.
- **Water Heater Name:** The name of the water heater.
- **Status:** The status of the system or component used for additions and alterations. Options are New and Existing.
- **Count:** The number of duplicate water heaters. This duplication number is only applicable for multiple water heaters that are identical in every way and in the same space or zone location.
- **Type:** Select the water heater type. Options are Instantaneous and Storage.
- **Fuel Source:** The water heater fuel source. Options are Electricity, FuelOil#1, NaturalGas and PropaneGas.
- **Electrical Ignition (check box):** Check this box if the water heater has an electrical ignition.
- **Storage Capacity:** This is the water heater's storage capacity.
- **Rated Capacity:** This is the water heater's rated capacity.
- **Thermal Efficiency:** The full load efficiency of a water heater at rated conditions expressed as a dimensionless ratio of output over input. This is also referred to as recovery efficiency.

- **Standby Loss Fraction:** The tank standby loss coefficient for the water heater.
- **Energy Factor:** The energy factor (EF) is the ratio of the energy delivered by the water heater divided by the energy used in the same units. The EF is calculated according to 10 CFR Part 430 Test Procedure, which specifies a 24-hour pattern of draws, a storage temperature, inlet water temperature and other test conditions.
- **Recovery Efficiency:** The water heater recovery efficiency.
- **Fluid Segment Outlet:** Select the fluid segment outlet. (Input is optional.)
- **Fluid Segment Makeup:** Select the fluid segment makeup. (Input is optional.)
- **Pilot Energy:** The water heater's pilot energy.
- **Draft Fan Power:** The power of the draft fan. (Input is optional.)
- **Part Load Curve Ref:** A set of factors that adjusts the full-load thermal efficiency for part load conditions. The factor is set as a curve. (Input is optional.)

Chiller Data Screen

To create a new Chiller, right click on FluidSystem (Chilled Water), scroll down to Create, and then select **Chiller.**

To access an existing Chiller, double click a Chiller option (Chiller icon).



Input Summary:

- **Currently Active Chiller**: The name of the currently selected chiller.
- **Name**: The name of the chiller.
- **Status:** Defines equipment as new or existing.
- **Type**: Select the type of chiller being used based on the compressor type or absorption process. Options are Centrifugal, Reciprocating, Scroll, Screw, Heat Recovery, Heat Pump, Single Effect Absorption, Double Effect Absorption, Triple Effect Absorption. Note that the heat rejection process is not included in the Type descriptor; see Condenser Type.
- **Condenser Type:** Select the method used to reject heat from the chiller. Options are Air and Fluid.
  Air-cooled chillers use air to cool the condenser coils. Water-cooled chillers use cold water to cool the condenser and additionally need either a cooling tower or a local source of cold water. Evaporatively cooled chillers are similar to air-cooled chillers, except they use a water mist to cool the condenser coil, which makes them more efficient.
- **Input Fuel:** Select the form of the primary energy input to the chiller. All chillers have a primary energy input along with electricity use for auxiliaries. This input describes the form of the primary energy. Options are Electricity, Steam, Hot Water, Natural Gas, or Oil.
- **Rtd. Capacity:** The cooling capacity of the chiller at rating conditions. The full load output of the chiller operating at rating temperatures and flows.

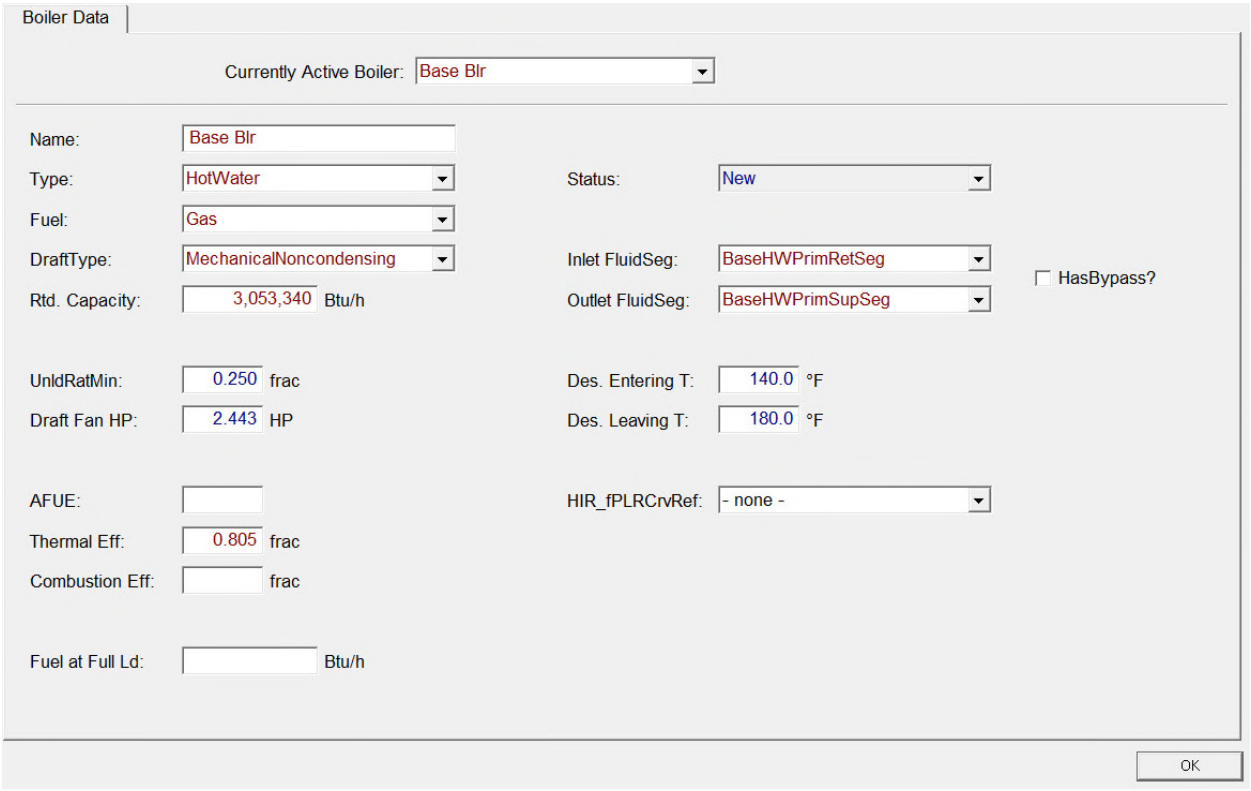
- **EntTemp -Dsgn:** The chilled water return temperature at design conditions. This temperature is used to size the chilled water components of the system.
- **(EntTemp) -Rated:** Rated chilled water entering temperature.
- **LvgTemp -Dsgn:** The chilled water supply temperature at design conditions. This temperature is used to size the chilled water components of the system.
- **(LvgTemp) -Rated**: Rated chilled water leaving temperature.
- **kW/ton:** The efficiency of water cooled electric chillers in kW/ton.
- **- IPLV:** The integrated part load value (IPLV) value for water cooled electric chillers in kW/ton.
- **- IPLV:** The IPLV value for fuel or heat driven chillers in COP units, Btu/Btu.
- **Min Unload Rat:** Minimum unloading ratio.
- **Min Part Ld Rat:** Minimum part load ratio.
- **Evap. Inlet FluidSeg**: Name of the fluid segment connected to the evaporator inlet. This is the chiller evaporator inlet connection, to chilled water return.
- **Evap. Outlet FluidSeg:** Name of the fluid segment connected to the evaporator outlet. The chiller condenser outlet connection, to condenser water return.
- **Evap. Has Bypass? (check box):** Whether or not the chiller has Bypass.
- **Cond. Inlet FluidSeg:** Name of the fluid segment connected to the condenser inlet. This is the chiller condenser inlet connection, to condenser water supply.

  Cond. Outlet FluidSeg: Name of the fluid segment connected to the condenser outlet. This is the chiller condenser outlet connection, to condenser water return.

Boiler Data Screen

To create a new Boiler right click on FluidSystem (Hot Water), scroll down to Create, and then select **Boiler.**

To access an existing Boiler, double click Boiler data (Boiler icon).



Input Summary:

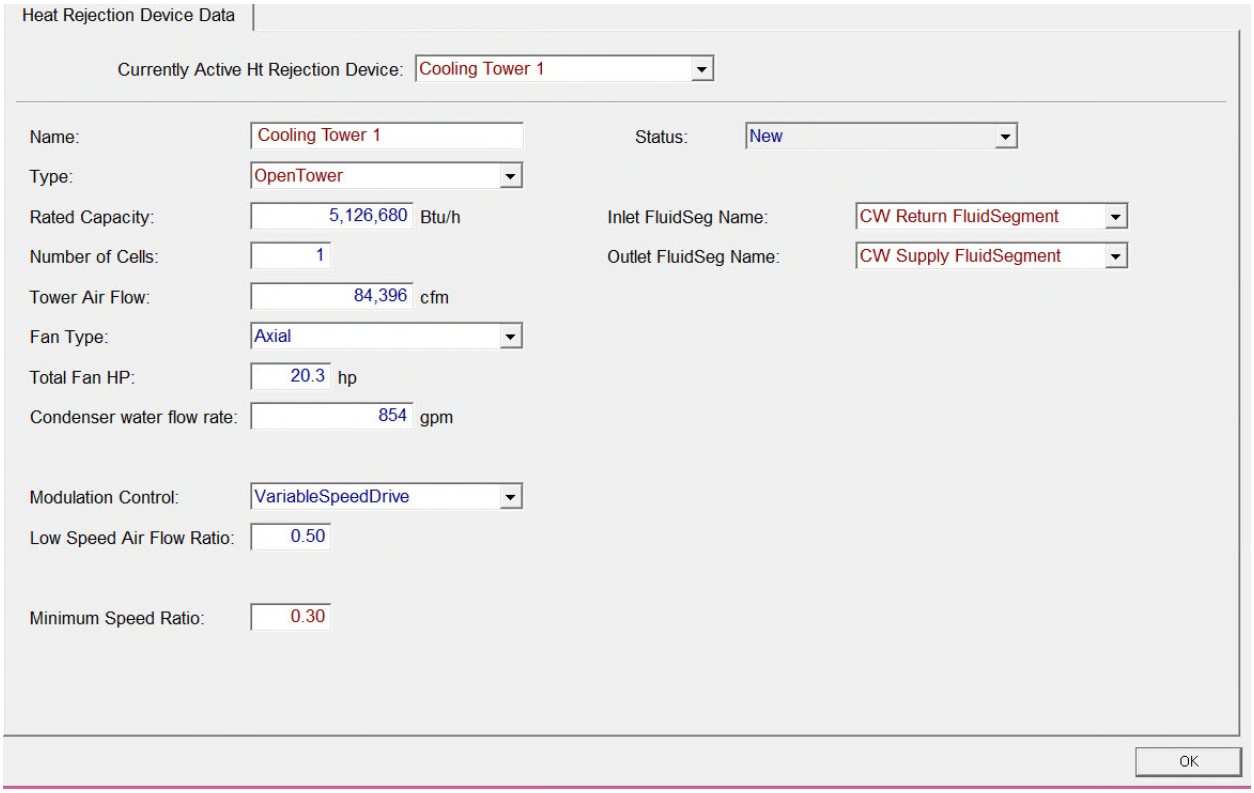
- **Currently Active Boiler:** The name of the currently selected boiler.
- **Name:** The name of the boiler.
- **Type**: Select the type of boiler in terms of steam or hot water. Boiler type in terms of fuel used or draft type are defined in other descriptors and rules.
- **Fuel**: Select the primary fuel used by the boiler to generate heat. Options are gas, oil or electric.
- **DraftType**: Select the type of boiler output. Options are MechanicalNoncondensing, Condensing, and Natural.
- **Rtd. Capacity** (Btu/h): Heat output of the boiler at full load and rated conditions.
- **UnldRatMin** (frac): The minimum load on the boiler at which the boiler can operate without cycling, expressed as a fraction of the full load capacity. At loads less than this, the boiler cycles at the minimum capacity as needed to meet the load.
- **Draft Fan HP**: The nameplate horsepower of the draft fan motor for boilers with mechanical draft.
- **AFUE**: The Annual Fuel Utilization Efficiency (AFUE) of the boiler. Applies only to smaller gas, propane, or oil fired boilers with output heating capacities of less than 300,000 Btu/hr. For larger fuel-fired boilers, use thermal efficiency, and for electric boilers use EIR.

- **Thermal Eff** (frac)**:** The Thermal Efficiency of the boiler. Applies only to larger gas, propane or oil fired boilers with output heating capacities of 300,000 Btu/hr or more. For smaller fuel-fired boilers use AFUE. For electric boilers use EIR.
- **Combustion Eff** (frac)**:** The thermal efficiency of the boiler. Applies only to fuel-fired boilers with capacities of more than 2,500,000 Btu/hr.
- **Fuel at Full Ld** (Btu/h): The fuel consumption at design conditions.
- **Status**: Defines if equipment is new, existing or modified.
- **Inlet FluidSeg:** The boiler inlet connection to hot water return, or HWR.
- **Outlet FluidSeg**: The boiler outlet connection to hot water supply, or HWS.
- **Des. Entering T**: The temperature of the hot water returned to the boiler at design conditions. This may not be the return water temperature during normal operation.
- **Des. Leaving T**: The temperature of the hot water supplied by the boiler at design conditions. This may not be the supply water temperature during normal operation.
- **HIR_fPLRCrvRef**: The name of the performance curve which modifies the boiler efficiency (heat input ratio) for the time step as a function of the part load ratio.
- **HasBypass?** (check box): Whether or not the Boiler has Bypass.

Heat Rejection Device Data Screen

To create a new Heat Rejection Device, right click on FluidSystem (Condenser Water), scroll down to Create, and then select **HeatRejection.**

To access existing Heat Rejection Device data, under Project expand **CondenserWater** and double click a heat rejection device option (Heat Rejection Device icon).



Input Summary:

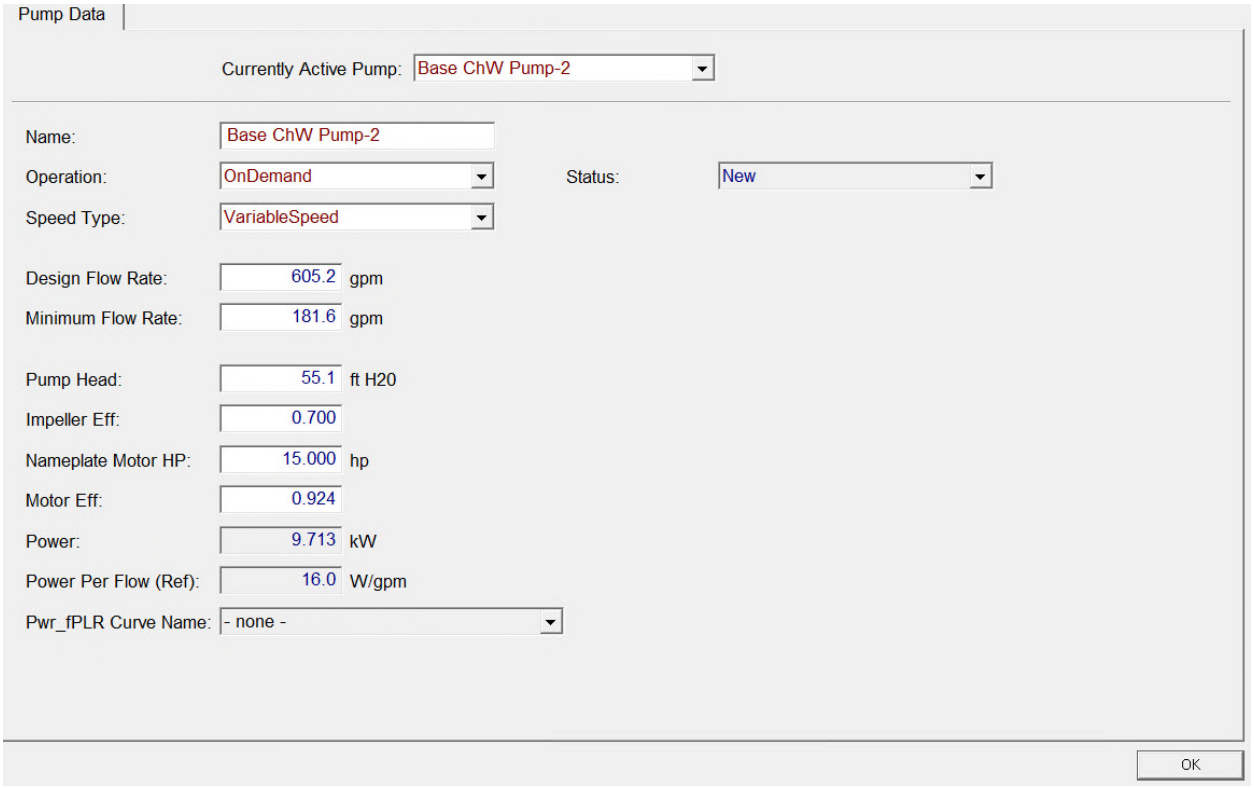
- **Currently Active Ht Rejection Device**: The name of the currently selected heat rejection device.
- **Name:** The name of the heat rejection device.
- **Type:** Select the type of heat rejection device. Heat rejection devices include cooling towers and ground source types. The available options are OpenTower andClosedTower,
- **Rated Capacity** (Btu/h): The rated cooling capacity at CTI test conditions.
  The cooling capacity at rated conditions of 95°F condenser water return, 85°F condenser water supply, and 78°F wet-bulb with a 3 gpm/nominal ton water flow, where a nominal ton is 15,000 Btu/hr.
- **Number of Cells**: The number of cells in the cooling tower. Each cell has its own fan and water flow allowing for responding to lower load conditions.
  Each cell will be modeled as equal size. Cells are subdivisions of cooling towers into individual cells, each with their own fan and water flow, allowing the cooling system to respond more efficiently to lower load conditions.
- **Tower Air Flow** (cfm): The rate of air moving through the tower.
- **Fan Type:** The type of fan used in a cooling tower. Fan type options are axial or centrifugal.

- **Total fan HP**: The sum of the nameplate rated horsepower (hp) of all fan motors on the cooling tower.
- **Condenser water flow rate** (gpm)**:** The rate of water flowing through the condenser.
- **Modulation Control:** The method used by the heat rejection device to modulate capacity. Options are Bypass, Cycling, TwoSpeed, and VariableSpeedDrive.
- **Low Speed Air Flow Ratio:** Ratio of the low-speed airflow to full speed airflow. The percentage full load airflow that the tower has at low speed or with the pony motor operating. This is equivalent to the percentage full load capacity when operating at low speed.
- **Minimum Speed Ratio**: Minimum fan speed for a variable speed tower. The minimum fan speed setting of a VSD controlling a cooling tower fan expressed as a ratio of full load speed.
- **Status:** Defines if equipment is new, existing or modified.
- **Inlet FluidSeg Name:** Select the heat rejection inlet connection to condenser water return (CWR), or create/import a FluidSegment.
- **Outlet FluidSeg Name**: Select the heat rejection outlet connection to condenser water supply (CWS), or create/import a FluidSegment.

Pump Data Screen

To create a new Pump, right click on FluidSegment, Boiler, Chiller, Cooling Tower or Water Heater, scroll down to Create, and then select **Pump.**

To access existing Pump data, double click a pump (Pump icon).



Input Summary:

- **Currently Active Pump**: The name of the currently selected pump.
- **Name**: The name of the pump.
- **Operation:** Select how the pump operation is controlled. Options are OnDemand, StandBy, and Scheduled.
- **Status**: Defines the pump status as New or Existing.
- **Speed Type**: Select the type of speed control for the pump. Options are ConstantSpeed and VariableSpeed.
- **Design Flow Rate** (gpm): The capacity of the pump.
- **Minimum Flow Rate** (gpm): The lowest flow rate available for the pump.
- **Pump Head** (ft H2o)**:** The pressure head of the pump at design flow conditions.
- **Impeller Eff:** Full load efficiency of the pump impeller.
- **Nameplate Motor HP:** The nameplate horsepower of the pump motor.
- **Motor Eff:** Indicates how well the motor converts electrical power into mechanical power and is defined as output power divided by input power expressed as a ratio.
- **Power** (kW)**:** The design power of the pump. This input gets calculated by the software based on user inputs for other pump parameters.

- **Power Per Flow (Ref)** (W/gpm)**:** The power of the pump per unit flow at design flow capacity.
- **Pwr_fPLR Curve Name:** The name of the power as a function of PLR curve. This is normally a biquadratic curve.

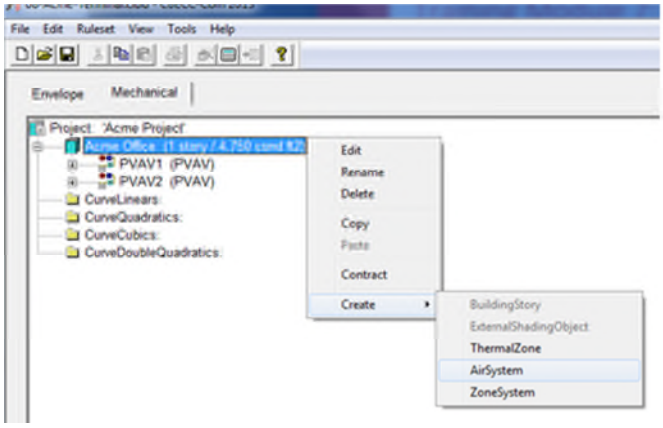
Building Data Screen

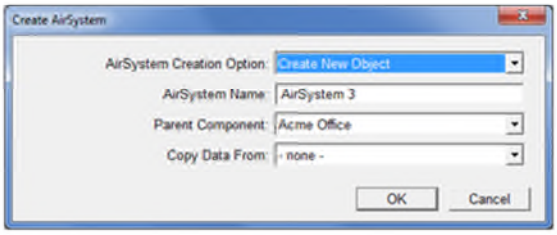
Note that the Building Data input screen is identical to the Building Data screen described above in Envelope Input Screen Details. Users may edit Building Data on either the Envelope or Mechanical tab of the user interface and that data will persist on both tabs.

See the Building Data Screen above in the Envelope tab for details.

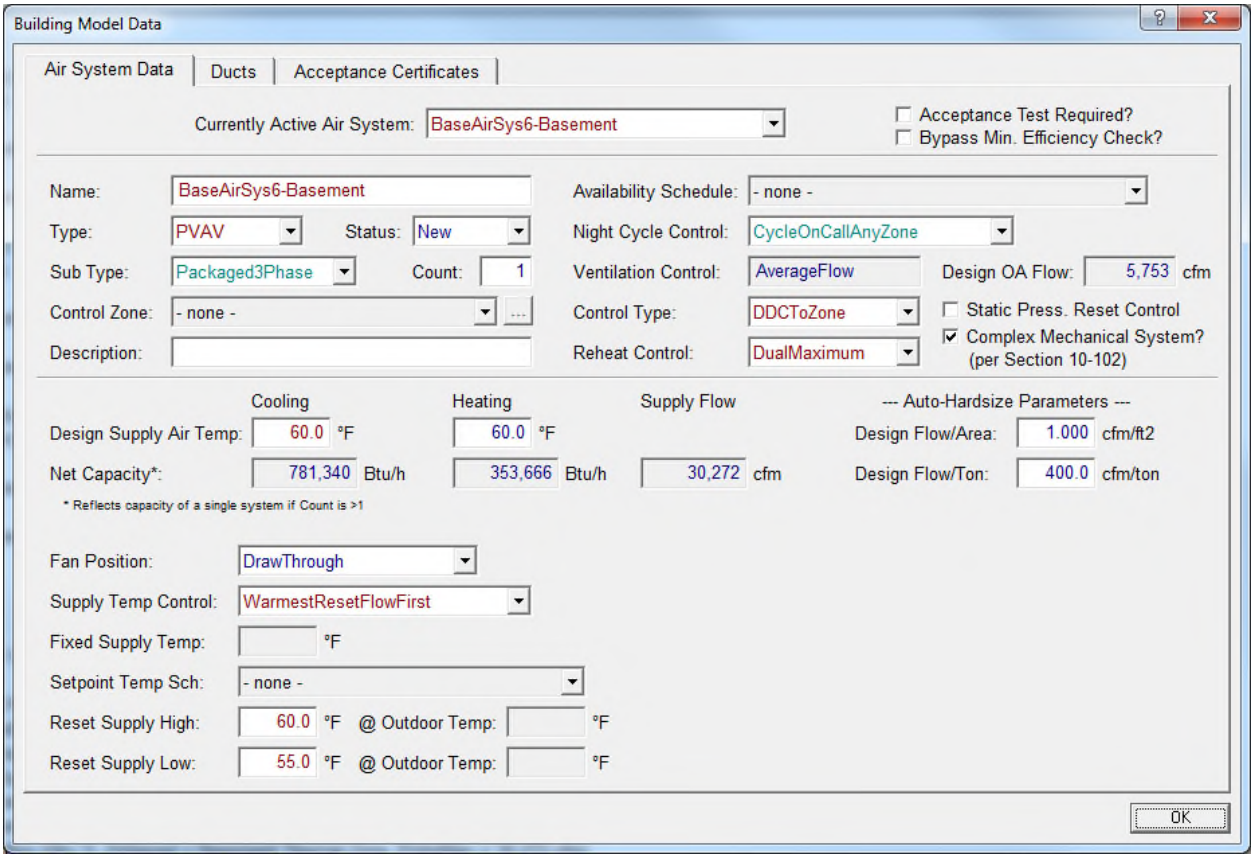
Air System Data Screen (Air System Data Tab)

The following types of Air Systems can be created: PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust. To create a new Air System, in the Mechanical tab right click on Building, scroll down to **Create**, and select **AirSystem.**





To access this screen, under building data double click an air system option (Air System icon).



Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Acceptance Test Required:** whether or not acceptance test is required on this air system.
- **Bypass Min Efficiency check?** : Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if 10 the equipment category of the system in the proposed design is not supported in CBECC-Com by the combination of Type/SubType or 2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust.
- **Status:** Defines system status as New, Existing, or Altered.
- **Sub Type:** Property used to define rating conditions and efficiency requirements of system components. Options available are Packaged 3Phase, Split3Phase, Packaged1Phase, Split1Phase,CRAC and CRAH.
- **Count**: The number of duplicate systems represented by the current system.
  The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be

specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

- **Control Zone**: A reference to the thermal zone name where controls for the Air System are located.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.
- **Night Cycle Control**: The HVAC system control method when heating, cooling and fan systems are scheduled to be Off. For this control, the space is controlled to the setback or setup temperature only; this control is not equivalent to night purge control. Options include StaysOff, CycleOnCallAnyZone, and CycleZoneFansOnly.
- **Ventilation Control:** Defaults as per rules to be same as PriAirCondgSysRef
- **Design OA Flow:** The design outside air flow of the Air System in cfm.
- **Control Type:** Select the type of control system used for an HVAC system. Applicable to multizone HVAC systems and their related equipment only. This input affects the proposed design system specification for zone level controls, supply air temperature reset controls, ventilation controls and fan and pump static pressure part-load curves. . Options are DDCToZone and Other.
- **Reheat Control:** Select the air/temperature control strategy for VAV reheat box in heating mode.
    - Single Maximum: The airflow is set to a minimum constant value in both the deadband and heating mode. The minimum airflow setpoint is typically 30 to 50 percent of maximum. This control mode typically has a higher minimum airflow than the minimum used in the dual maximum below, resulting in more frequent reheat.
    - Dual Maximum: raises the SAT as the first stage of heating, and increases the airflow to the zone as the second stage of heating, as follows:
      1. The first stage of heating consists of modulating the zone supply air temperature setpoint up to a maximum setpoint no larger than 95°F while the airflow is maintained at the deadband flow rate.
      2. The second stage of heating consists of modulating the airflow rate from the deadband flow rate up to the heating maximum flow rate (50 percent of design flow rate).

- **Static Press. Reset Control** (check box): Select to indicate static pressure reset control.
- **Complex Mechanical System? (per Section 10-102)** (check box): Check to indicate whether an HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. Single zone air systems are simple, except for any with hot water heating of chilled water cooling. All multizone air systems are complex.
- **Design Supply Air Temp** (Cooling): Enter the design cooling supply air temperature of single duct system or the cold duct of a dual duct system. This is also the control setpoint for Fixed air temperature control. (Input is optional.)
- **Design Supply Air Temp** (Heating): Enter the design heating supply air temperature of single duct system or the hot duct of a dual duct system. This is also the control setpoint for Fixed air temperature control. (Input is optional.)

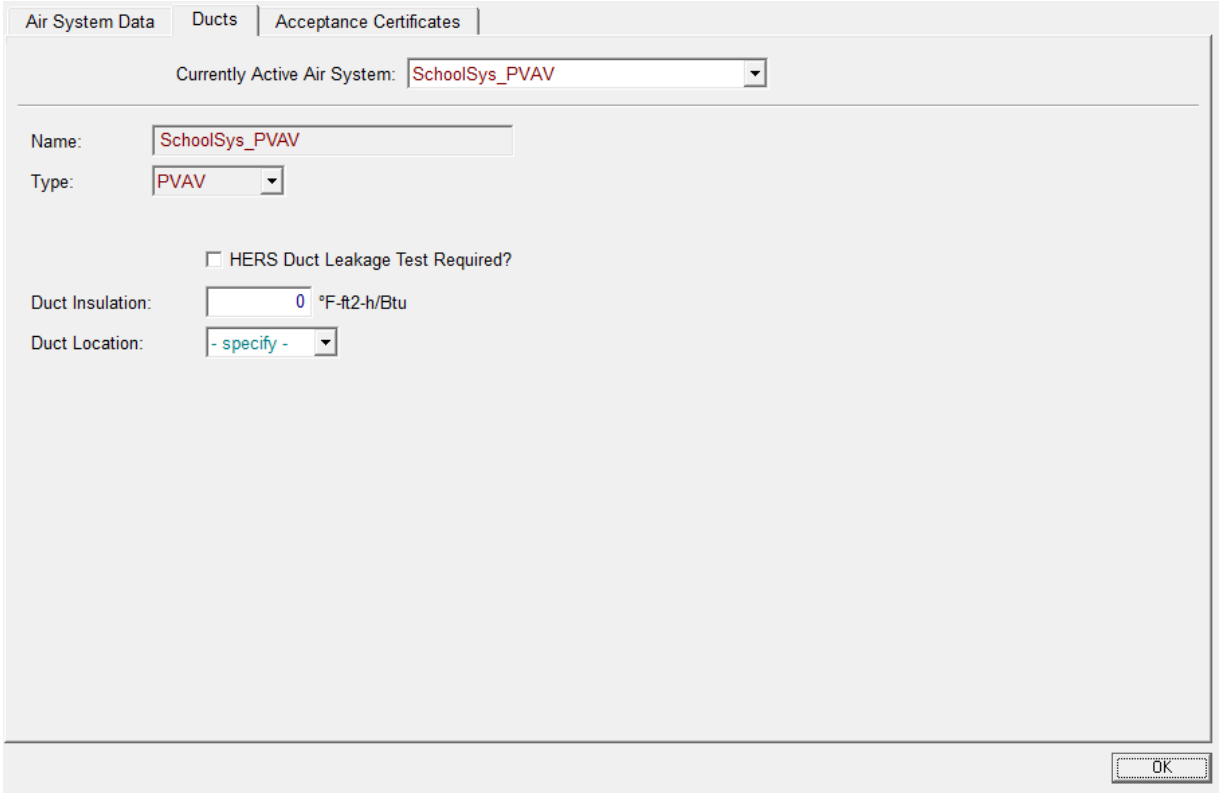
- **Net Capacity*** (Cooling): Net Capacity of the Cooling System. Reflects capacity of a single system if count is > 1.
- **Net Capacity*** (Heating): Net capacity of the Heating System. Reflects capacity of a single system if count is > 1.
- **Net Capacity*** (Supply Flow): The capacity of the supply fan in cfm. Reflects capacity of a single system if count is > 1.
- **Fan Position:** The position of the supply fan relative to the cooling coil. Options available are DrawThrough and BlowThrough.
- **Supply Temp Control**: The method of controlling the supply air temperature of a single duct system, or the cold duct of dual duct system. Options available are Fixed, WarmestResetFlowFirst, OutdoorAirReset and Scheduled.
- **Fixed Supply Temp**: The temperature of the air being supplied to the space.
- **Setpoint Temp. Sch**: The scheduled supply air temperature setpoint of a single duct air system, or the scheduled setpoint temperature of the cold duct in a dual duct system.
- **Reset Supply High:** The maximum (high) reset supply air temperature for a single duct system, or for the cold duct of a dual duct system.
  If supply air temperature is reset based on outside air temperature, specifies the supply air high setpoint to at the outside drybulb low. If supply air temperature is reset based on 'Warmest' zone, specifies the maximum supply air temperature for reset.
- **@ Outdoor Temp** (High): The minimum (low) outdoor air temperature at the high reset supply air temperature during cooling. Applicable when cooling supply air temperature is reset based on outside air temperature, specifies the outside drybulb low.
- **Reset Supply Low:** The minimum (low) reset supply air temperature during cooling. If cooling supply air temperature is reset based on outside air temperature, specifies the supply air low setpoint to at the outside drybulb high. If cooling supply air temperature is reset based on warmest zone, specifies the minimum supply air temperature for reset.
- **@ Outdoor Temp** (Low): The maximum (high) outdoor air temperature at the low reset supply air temperature during cooling. If cooling supply air temperature is reset based on outside air temperature, specifies the supply air low setpoint to at the outside drybulb high.

Auto-Hardsize Parameters section

- **Design Flow/Area (cfm/ft2):** Air flow per sq ft of area for auto hardsizing the system
- **Design Flow/Ton (cfm/ton):** Air flow per net cooling ton for auto hardsizing the system

Air System Data Screen (Ducts Tab)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Ducts** tab.



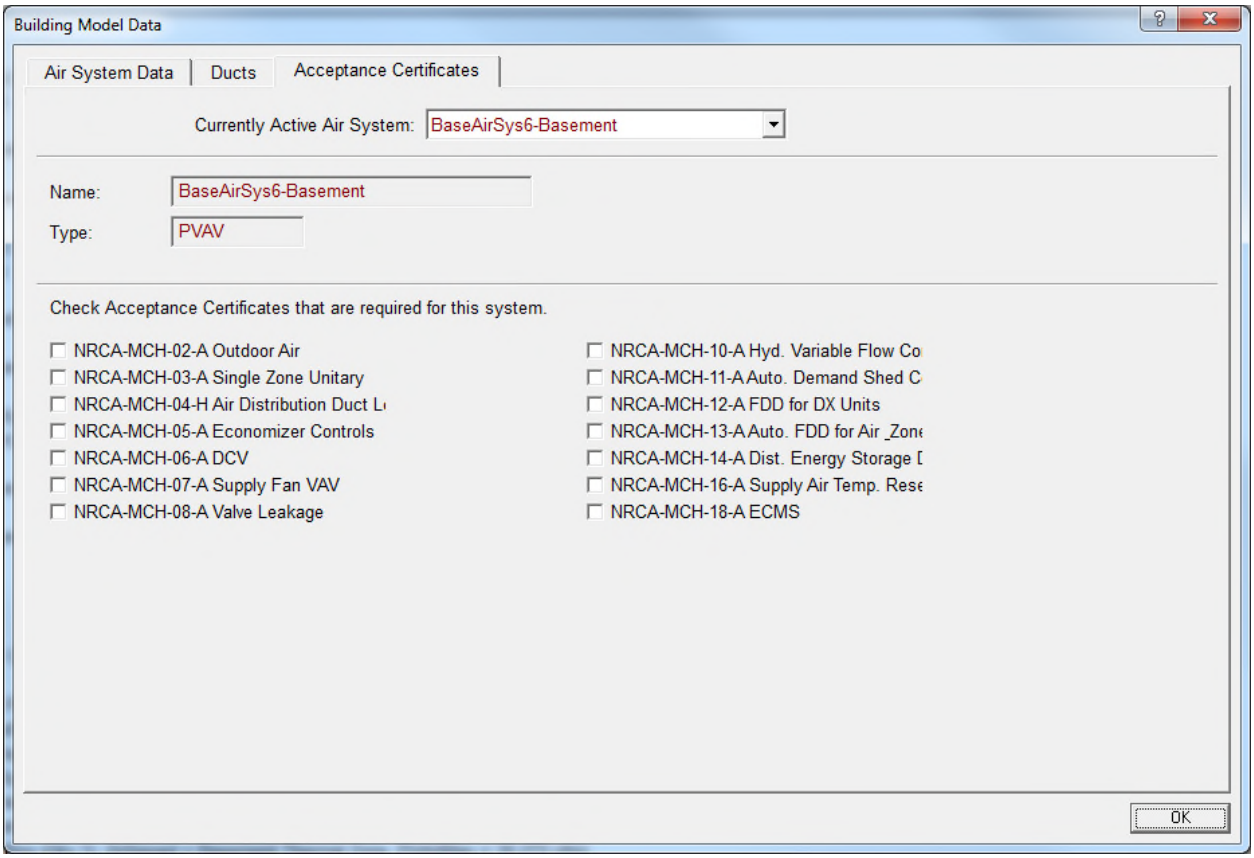
Note: These inputs are for reporting only and will not impact simulation results.

Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust.
- **HERS Duct Leakage Test Required?** (check box): Check box to indicate whether HERS duct leakage testing is required, used for reporting. HERS duct leakage testing is required if duct systems: 1. Supply conditioned air to occupiable space from a single zone constant speed system, 2. Serve less the 5,000 ft2 of conditioned floor area, and 3. More than 25% of the total duct system surface area is located in unconditioned space.
- **Duct Insulation:** The duct insulation R-value for reporting.
- **Duct Location:** The duct location (Conditioned, Unconditioned, NA) for reporting.

Air System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Acceptance Certificates** tab.

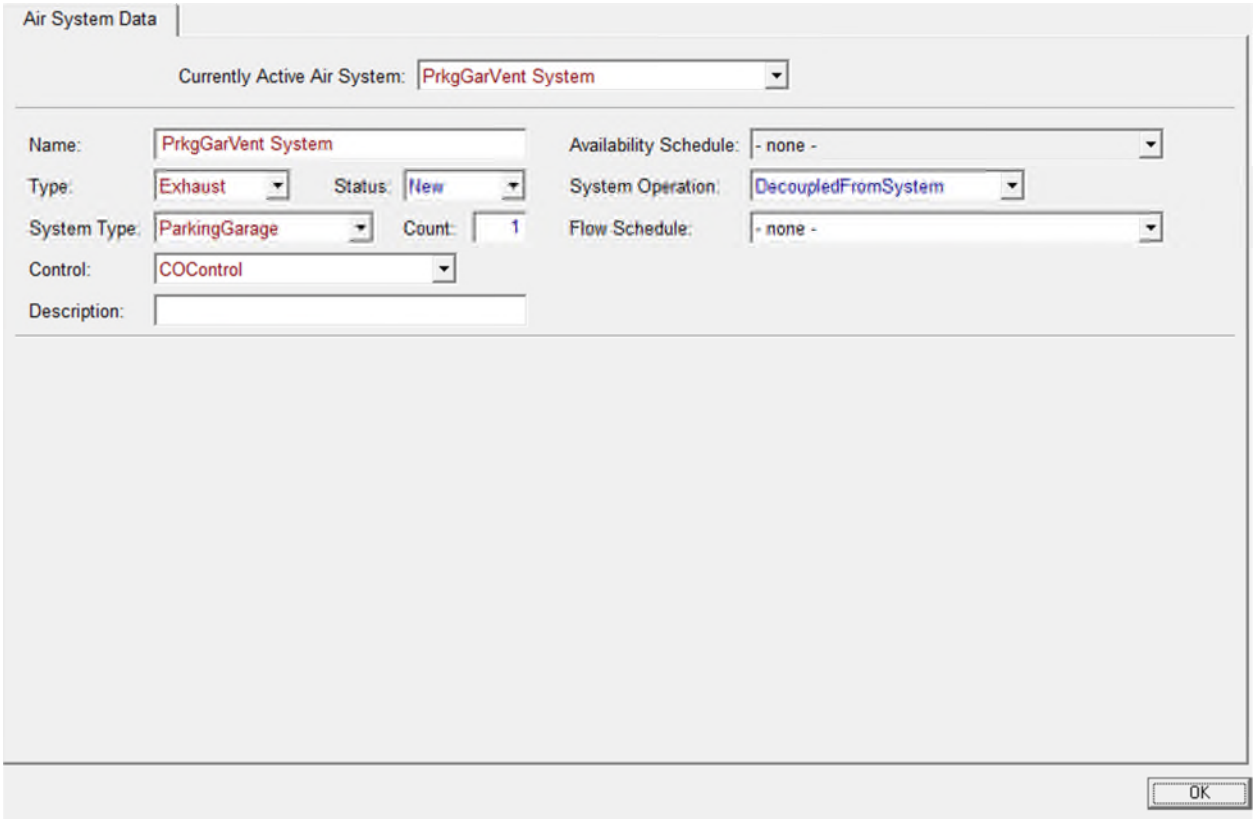


Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust.
- **Acceptance Certificates:** Check boxes to indicate whether an acceptance certificate of the number matching the term name is required, used for reporting.

Air System Data Screen (Exhaust)

To access this screen, under Building data double click an air system option (Air System icon). In the **Type** field, select Exhaust.



Input Summary:

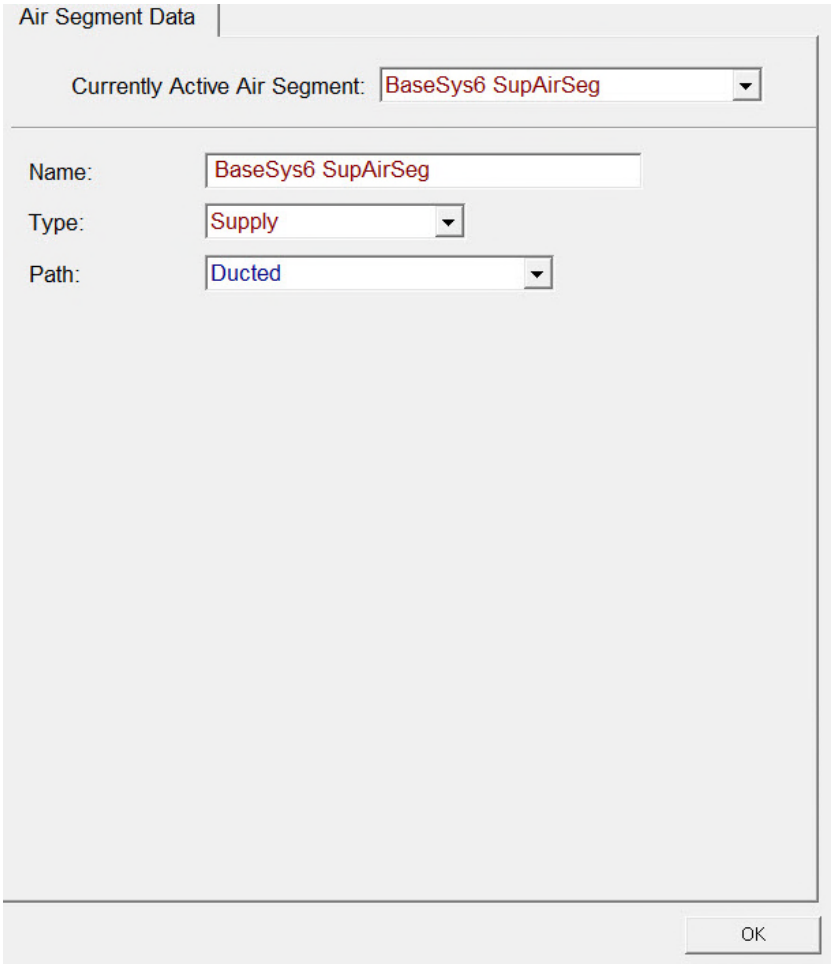
- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Exhaust Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system.
- **Status:** Defines system status as New, Existing, or Altered.
- **System Type:** The type of exhaust system. This input is used to default assumptions for system controls and power. Options available are Laboratory, Commercial Kitchen and Parking Garage exhaust systems and can only be assigned to thermal zones comprised of the applicable SpaceFunction categories.
- **Count**: The number of duplicate systems represented by the current system.
  The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Control**: Control Type for the Exhaust System. Options available are COContol, NoCOControl.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.

- **System Operation**: Describes whether exhaust system availability control is interlocked with the HVAC system availability. For compliance analysis, exhaust fans are assumed to have the same availability schedule as the ThermalZone's ventilation system, but does not night cycle. Options available are DecoupledFromSystem and CoupledFromSystem.
- **Flow Schedule:** The schedule that defines the flow schedule for the system. This schedule is prescribed for Type = Commercial Kitchen and Laboratory exhaust systems. For General exhaust, the schedule is user defined, but will default to match the HVAC system availability schedule for the ThermalZones that the exhaust system serves. For Parking Garage systems, the schedule is prescribed to be constant, and the fan power is adjusted to account for variable speed fan control.

Air Segment Data Screen

To create a new Air Segment, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **AirSegment**

To access this screen, double click an air segment option (Air Segment icon).

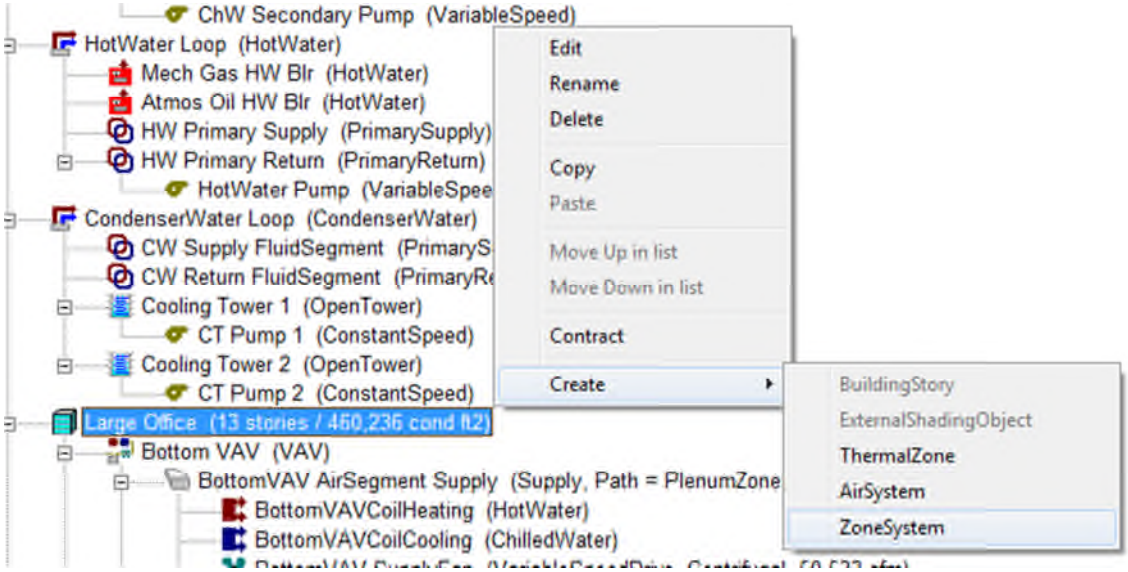


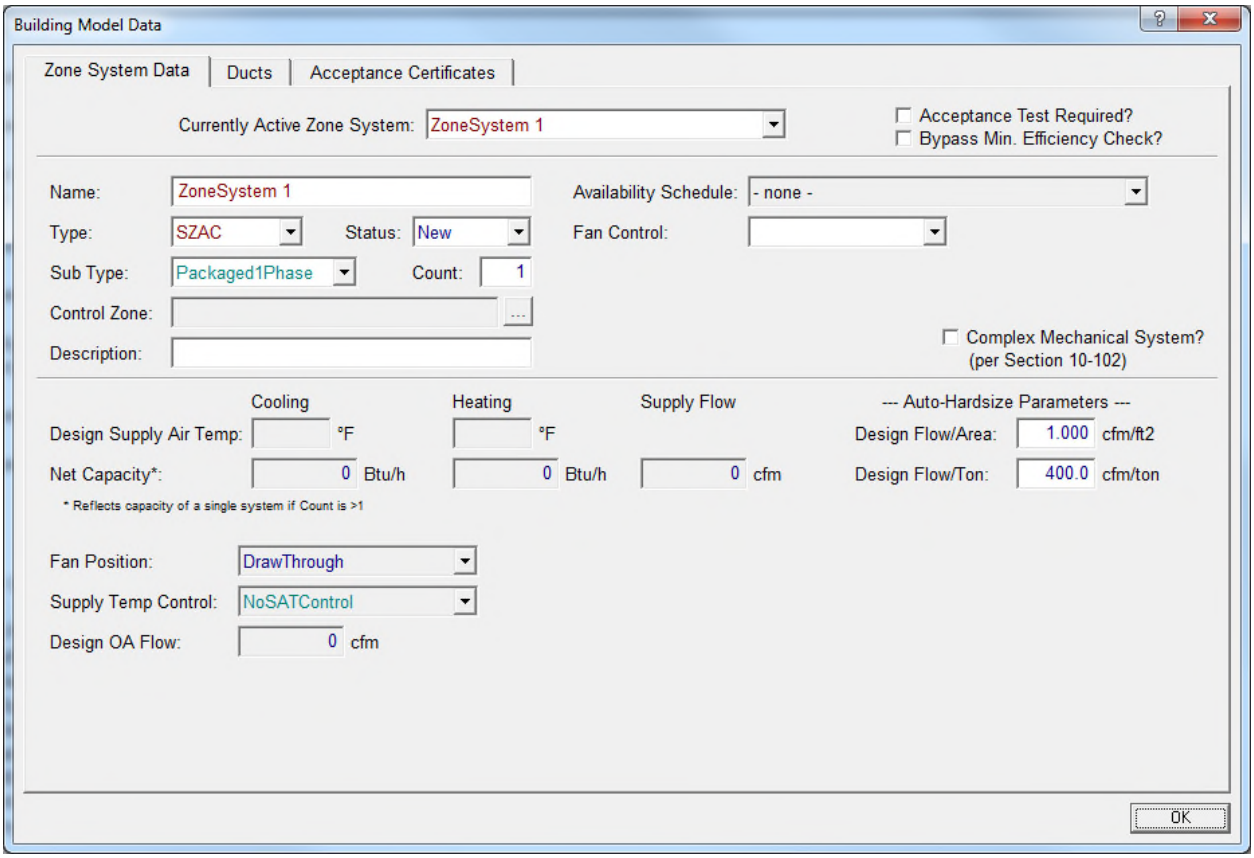
Input Summary:

- **Currently Active Air Segment:** The name of the currently selected Air Segment.
- **Name**: The name of the air segment.
- **Type**: Select the type of Air Segment. Options are Supply, Return, Relief, and Exhaust.
- **Path**: Select the path of air flow to/from the zone. Options are NotApplicable, Direct, Ducted, and PlenumZones.

Zone System Data Screen

The following types of Zone Systems can be created: PTAC, PTHP, FPFC, Baseboard, WSHP and Exhaust. To create a new zone system, right click the Building data, scroll down to **Create**, and select **ZoneSystem.** The **Create ZoneSystem** dialog box appears. Enter data and click **OK**.





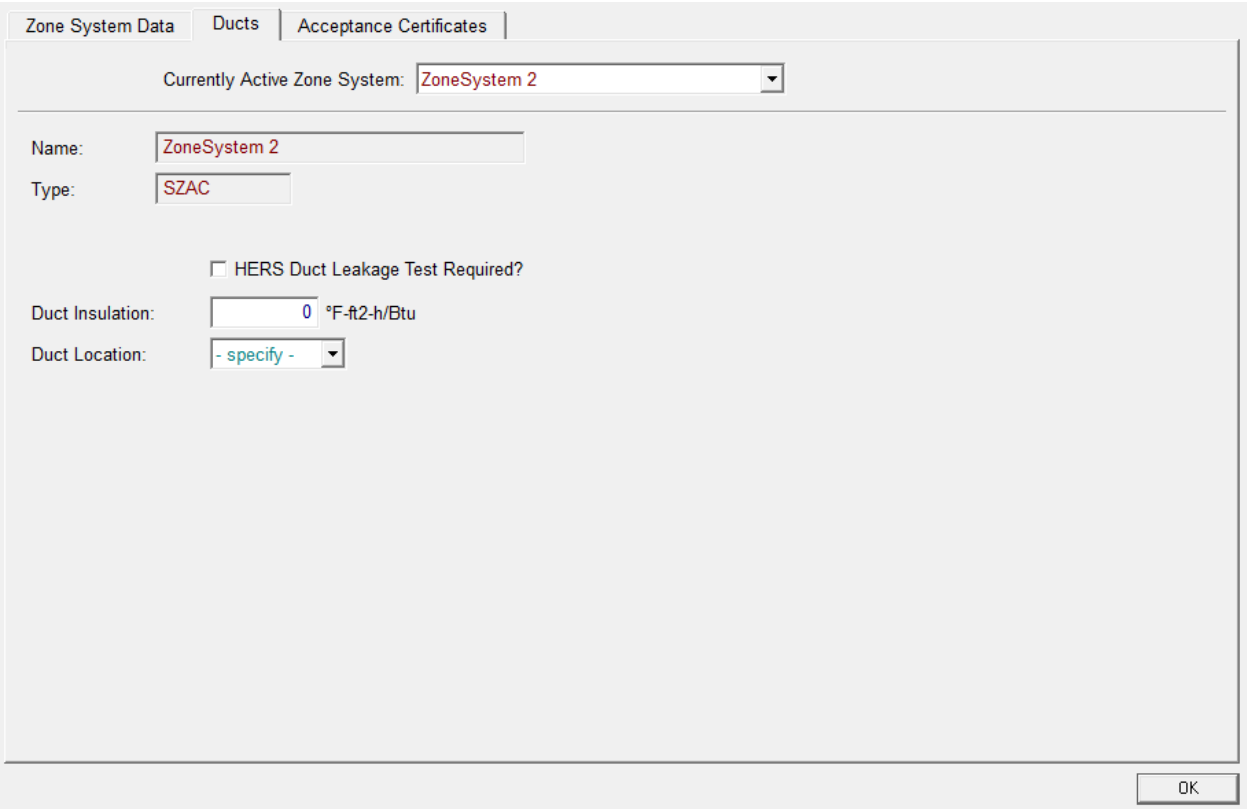
Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required:** whether or not acceptance test is required on this zone system.
- **Bypass Min Efficiency check?** : Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if 10 the equipment category of the system in the proposed design is not supported in CBECC-Com by the combination of Type/SubType or 2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install.
- **Name**: The name of the zone system.
- **Availability Schedule:** The schedule that defines when the zone system can operate.
- **Type**: Select the type of zone system. Options are SZAC, SZHP, PTAC, PTHP, FPFC, Baseboard, WSHP and Exhaust.
- **Status**: Defines system status as New, Existing, or Altered.
- **Fan Control:** The zone HVAC system fan control method system is scheduled to be On.
- **Sub Type:** Property used to define rating conditions and efficiency requirements of system components. Options available are Packaged 3Phase, Split3Phase, Packaged1Phase, and Split1Phase.
- **Count**: The number of duplicate systems represented by the current system.
  The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Control Zone:** The thermal zone controlling the zone system.
- **Description:** A brief description of the zone system that ties the zone system to the building plans.
- **Complex Mechanical System? (per Section 10-102):** Check to indicate whether an HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. PTAC, PTHP and exhaust zone systems are simple – FPFC, WSHP and Baseboard zone systems are complex.
- **Design Supply Air Temp (Cooling):** The design cooling supply air temperature for sizing zone/system airflows.
- **Design Supply Air Temp (Heating):** The design heating supply air temperature for sizing zone/system airflows.
- **Net Capacity* (Cooling)** (Btu/h)**:** The net cooling capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Net Capacity* (Heating)** (Btu/h)**:** The net heating capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Net Capacity* (Supply Flow)** (cfm)**:** The total supply fan capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Design Flow/Area** (cfm/ft2)**:** Used for AutoHardSizing only, a system level specification of air side supply air flow capacity based on system conditioned floor area. This value is referenced for AutoHardSizing of system capacities.

- **Design Flow/Ton** (cfm/ton)**:** Used for AutoHardSizing only, a system level specification of air side cooling capacity based on supply air flow. This value is referenced for AutoHardSizing of system capacities.
- **Fan Position**: The position of the supply fan relative to the cooling coil (DrawThrough or BlowThrough).
- **Supply Temp Control:** The method of controlling the supply air temperature of a single duct system, or the cold duct of dual duct system.
- **Design OA Flow:** The rate of outside air that needs to be delivered by the system at design conditions.

Zone System Data Screen (Ducts Tab)

To access this screen, under building data double click an Zone system option and then click on the **Ducts** tab.



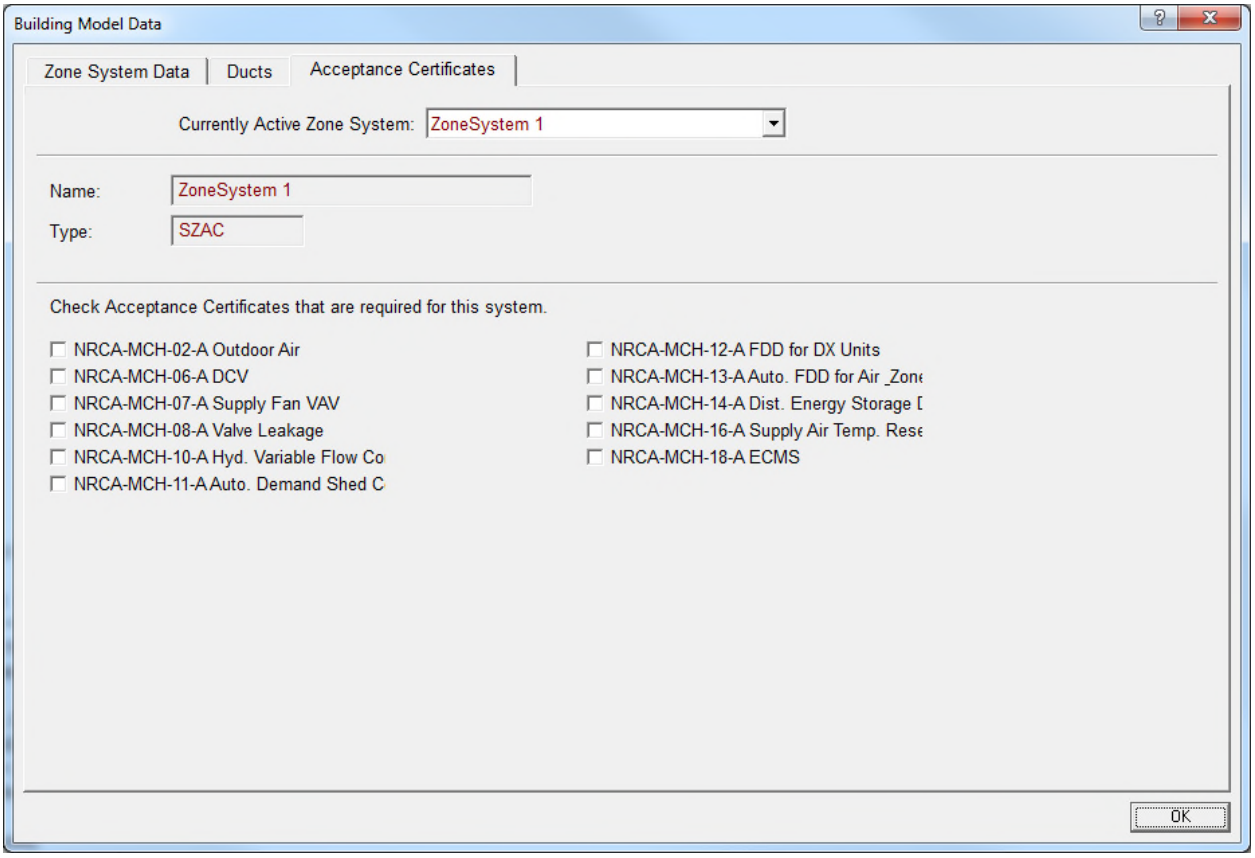
Note: These inputs are for reporting only and will not impact simulation results.

Input Summary:

- **Currently Active Zone System:** The name of the currently selected Air System.
- **Name:** The name of the ZoneSystem.
- **Type**: Type of zone system,
- **HERS Duct Leakage Test Required?** (check box): Check box to indicate whether HERS duct leakage testing is required, used for reporting. HERS duct leakage testing is required if duct systems: 1. Supply conditioned air to occupiable space from a single zone constant speed system, 2. Serve less the 5,000 ft2 of conditioned floor area, and 3. More than 25% of the total duct system surface area is located in unconditioned space.
- **Duct Insulation:** The duct insulation R-value for reporting.
- **Duct Location:** The duct location (Conditioned, Unconditioned, NA) for reporting.

Zone System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click an zone system option and then click on the **Acceptance Certificates** tab.

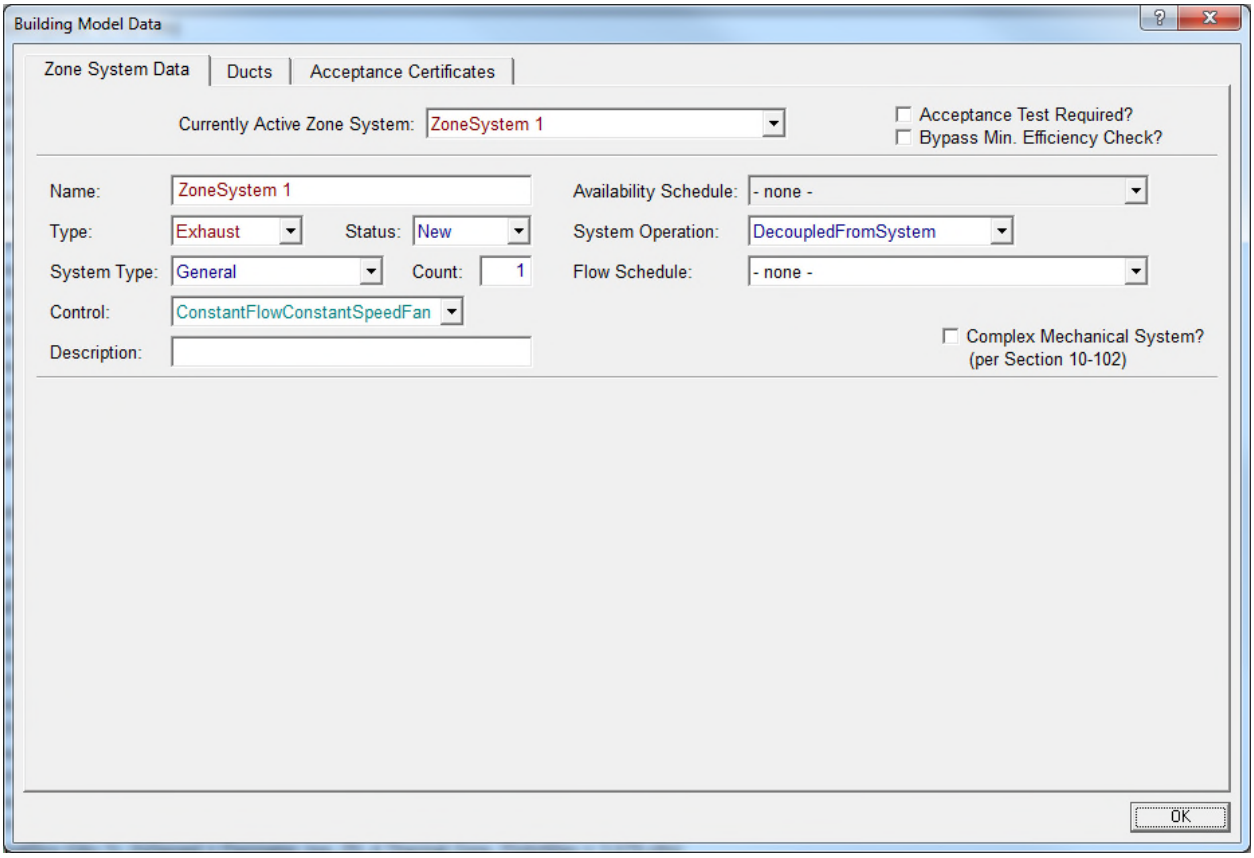


Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Name:** The name of the ZoneSystem.
- **Type**: Type of zone system,.
- **Acceptance Certificates:** Check boxes to indicate whether an acceptance certificate of the number matching the term name is required, used for reporting.

Zone System Data Screen (Exhaust)

To access this screen, right click the Building data, scroll down to **Create**, and select **ZoneSystem.** The **Create ZoneSystem** dialog box appears. Enter data and click **OK** and select Type **Exhaust**.



Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required?:** Check to indicate whether a test is required for an HVAC system (for reporting purposes).
- **Bypass Min Efficiency check?** : Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if 10 the equipment category of the system in the proposed design is not supported in CBECC-Com by the combination of Type/SubType or 2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install.
- **Name:** The name of the Exhaust System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system.
- **Status:** Defines system status as New, Existing, or Altered.
- **System Type:** The type of exhaust system. This input is used to default assumptions for system controls and power. Options available are Laboratory, Commercial Kitchen and

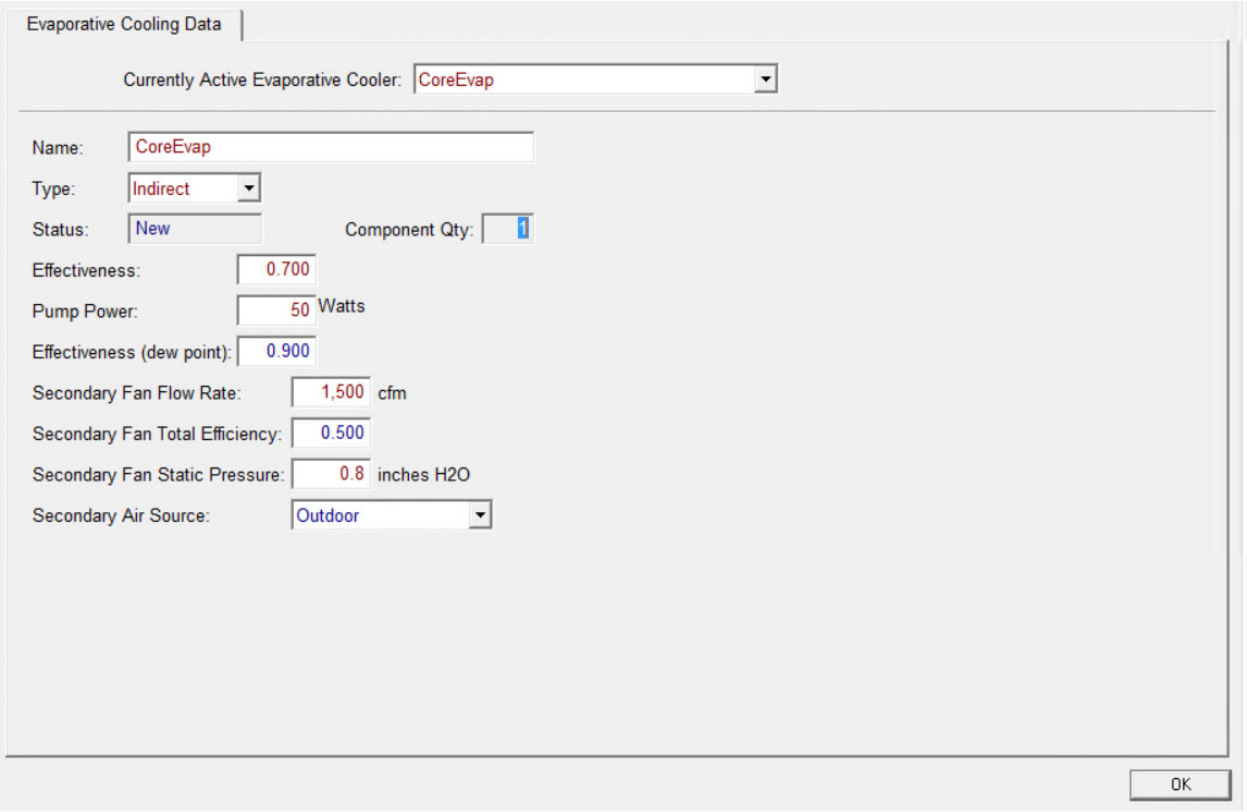
Parking Garage exhaust systems and can only be assigned to thermal zones comprised of the applicable SpaceFunction categories.

- **Count**: The number of duplicate systems represented by the current system.
  The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Control**: Control Type for the Exhaust System. Options available are COContol, NoCOControl.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.
- **System Operation**: Describes whether exhaust system availability control is interlocked with the HVAC system availability. For compliance analysis, exhaust fans are assumed to have the same availability schedule as the ThermalZone's ventilation system, but does not night cycle. Options available are DecoupledFromSystem and CoupledFromSystem.
- **Flow Schedule:** The schedule that defines the flow schedule for the system. This schedule is prescribed for Type = Commercial Kitchen and Laboratory exhaust systems. For General exhaust, the schedule is user defined, but will default to match the HVAC system availability schedule for the ThermalZones that the exhaust system serves. For Parking Garage systems, the schedule is prescribed to be constant, and the fan power is adjusted to account for variable speed fan control.
- **Complex Mechanical System? (Per Section 10-102):** Check to indicate whether HVAC system is simple or complex (for reporting purposes).

Evaporative Cooling Data Tab (Indirect)

To create a new Evaporative Cooler, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **Evaporative Cooler.**

To access an existing Evaporative Cooler, double click an indirect evaporative cooling option (Evaporative Cooling icon).



Input Summary:

- **Currently Active Evaporative Cooler:** Select the name of the evaporative cooler.
- **Name:** The name of the evaporative cooler.
- **Type:** The type of evaporative cooler. For Indirect or Direct evaporative coolers, specify the indirect and direct portions as two separate devices.
- **Status**: The status of the system or component used for additions or alterations.
- **Component Qty**: The number of duplicate systems can only be > 1 when all attributes of the system are the same. If Count is specified to be > 1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset will apply multipliers for the final simulation.
- **Effectiveness**: The effectiveness of the evaporative cooler. The leaving air temperature will be the entering temperature minus the difference between the entering dry-bulb and wet-bulb temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Twb) x Eff.
- **Pump Power (Watts)**: Power consumption by the evaporative cooler water pumping.
- **(Indirect) Effectiveness (dewpoint)**: The effectiveness of the evaporative cooler based on dewpoint depression. This field is an optional input that determines the maximum leaving air temperature based on dewpoint depression rather than wet-bulb depression. The leaving air

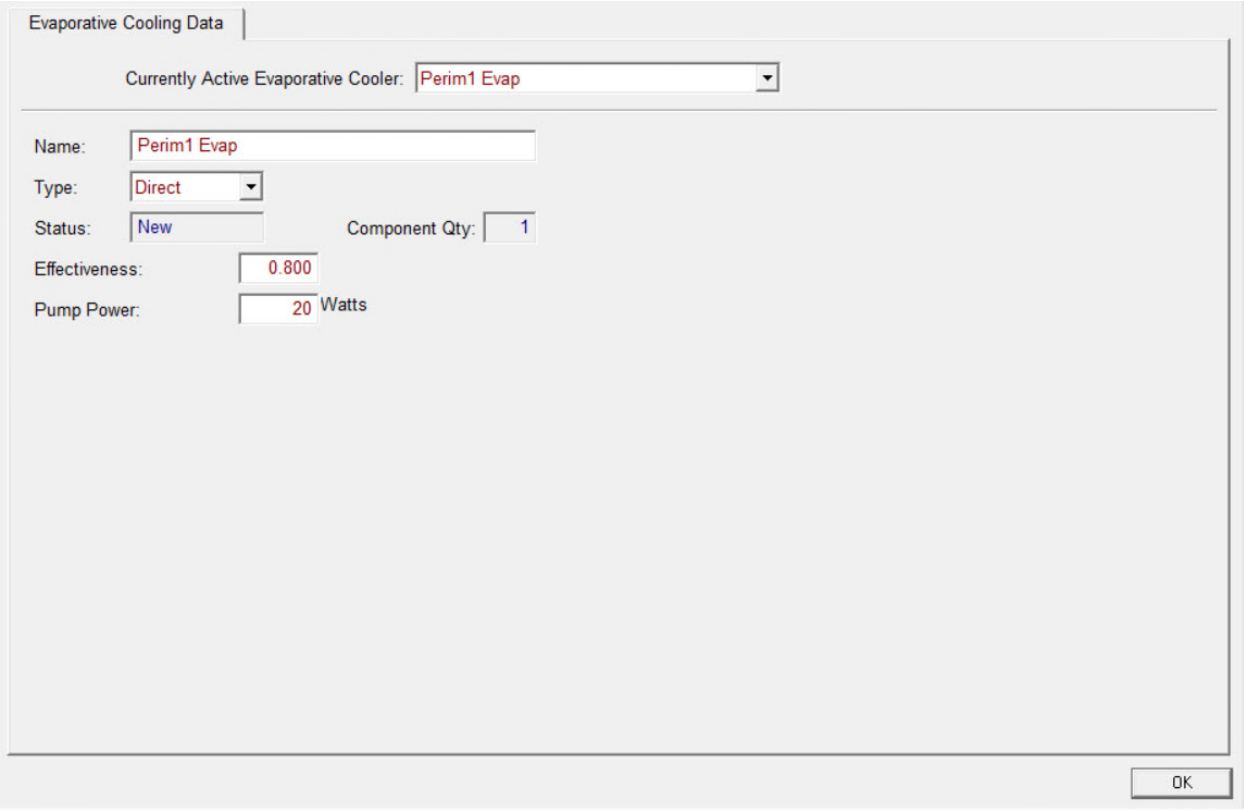
temperature calculated with the DewPtEff will be the entering temperature minus the difference between the entering dry-bulb and dewpoint temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Tdp) x Eff. The actual leaving temperature will be the warmer of the two temperatures calculated from the wet-bulb and dewpoint effectiveness values.

- **Secondary Fan Flow Rate (cfm)**: The flow rate of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler.
- **Secondary Fan Total Efficiency**: The overall efficiency of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler. This efficiency includes that of the fan, motor and drive.
- **Secondary Fan Static Pressure (inches H2o)**: The total static pressure of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler.
- **Secondary Air Source**: The primary source of air supplied to the secondary (wet) side of the indirect evaporative cooler. If RETURN is selected and there the air system return air cannot meet the airflow desired by the evaporative cooler, the difference will be made up using outdoor air.

Evaporative Cooling Data Tab (Direct)

To create a new Evaporative Cooler, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **Evaporative Cooler.**

To access an existing Evaporative Cooler, double click a direct evaporative cooling option (Evaporative Cooling icon).



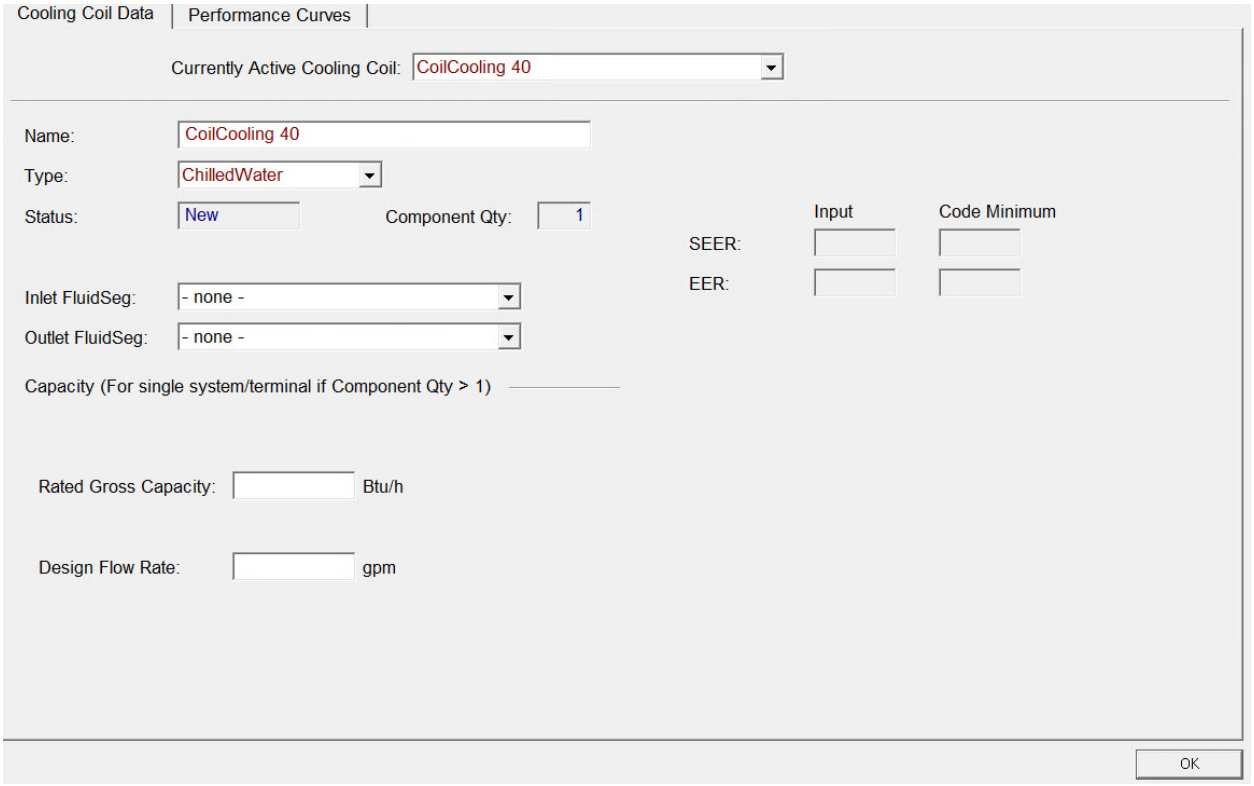
Input Summary:

- **Currently Active Evaporative Cooler:** Select the name of the evaporative cooler.
- **Name:** The name of the evaporative cooler.
- **Type:** The type of evaporative cooler. For Indirect or Direct evaporative coolers, specify the indirect and direct portions as two separate devices.
- **Status**: The status of the system or component used for additions or alterations.
- **Component Qty**: The number of duplicate systems can only be > 1 when all attributes of the system are the same. If Count is specified to be > 1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset will apply multipliers for the final simulation.
- **Effectiveness**: The effectiveness of the evaporative cooler. The leaving air temperature will be the entering temperature minus the difference between the entering dry-bulb and wet-bulb temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Twb) x Eff.
- **Pump Power (Watts)**: Power consumption by the evaporative cooler water pumping.

Cooling Coil Data Screen (Chilled Water)

To create a new Cooling Coil, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **CoilCooling.**

To access this screen, double click a cooling coil option (Cooling Coil icon). In the **Type** field, select **ChilledWater.**



Input Summary:

- **Currently Active Cooling Coil:** The name of the currently selected cooling coil.
- **Name**: Name of the cooling coil.
- **Type:** Select the type of cooling coil. Options are Chilled Water or Direct Expansion.
- **Status:** Defines cooling coil as New or Existing.
- **Inlet FluidSeg**: Defines the inlet/supply-side fluid segment of hydronic coils. Options are create/import PrimarySupply FluidSegment (and apply only here), create/import SecondarySupply FluidSegment (and apply only here), BaseHWPrimSupSeg, BaseCWPrimSupSeg, BaseChWPrimSupSeg, and SHWSupply1.
- **Outlet FluidSeg:** Defines the outlet/return-side fluid segment of hydronic coils. Options are create/import PrimaryReturn FluidSegment (and apply only here), create/import SecondaryReturn FluidSegement (and apply only here), BaseHWPrimRetSeg, BaseCWPrimRetSeg, and BaseChWPrimRetSeg.

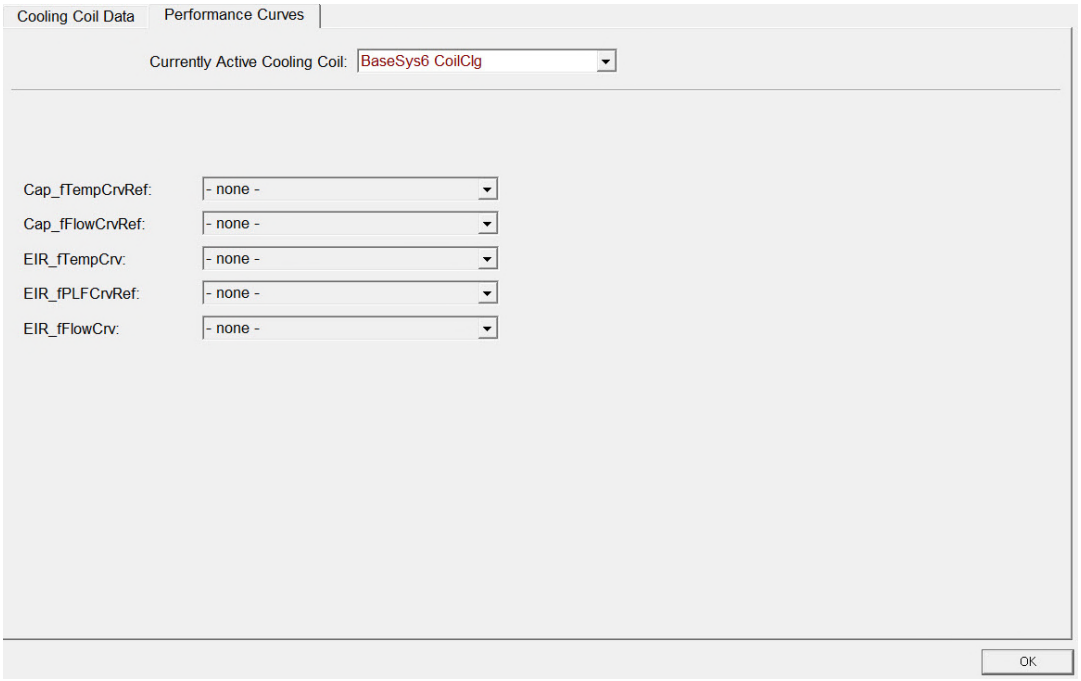
Capacity (For single system/terminal if Component Qty > 1) section

- **Rated Gross Capacity** (Btu/h): The gross total (both sensible and latent) cooling capacity of a cooling coil or packaged DX system at Air Conditioning, Heating, & Refrigeration Institute (AHRI) rating conditions.

The gross capacity is the total cooling capacity without adjustments for fan heat.

- **Design Flow Rate** (gpm): The rate of water moving through the coil.

Cooling Coil Data Screen (Chilled Water), Performance Curves Tab



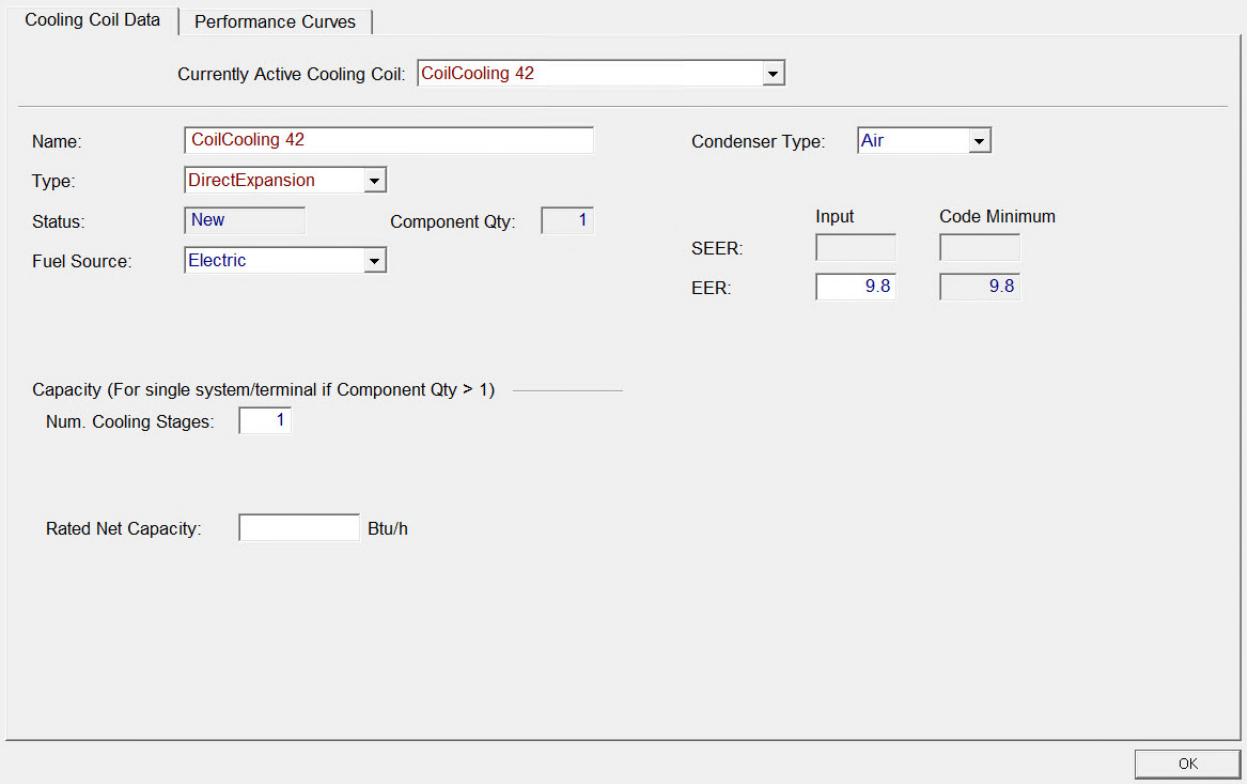
Performance Curves tab

- **Currently Active Cooling Coil:** The name of the currently selected cooling coil.
- **Cap_fTempCrvRef**: A curve hat describes the adjustment of cooling coil capacity as a function of temperature.
- **Cap_fFlowCrvRef**: Normalized curve that varies cooling capacity as a function of airflow, which affects system latent capacity. Used for EnergyPlus DX coil model only.
- **EIR_fTempCrv**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil and condenser conditions.
- **EIR_fPLFCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of part-load factor. This curve type is specific to EnergyPlus.
- **EIR_fFlowCrv**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil flow. This curve type is specific to EnergyPlus.

Cooling Coil Data Screen (Direct Expansion)

To create a new Cooling Coil, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **CoilCooling.** Make selections and click **OK**. The CoolingCoil Primary Data dialog box then appears. Select DirectExpansion and click **OK**.

To access an existing Cooling Coil, double click a cooling coil (Cooling Coil icon). In the **Type** field, select **DirectExpansion**.



Input Summary:

- **Condenser Type:** The type of condenser for a Direct Expansion (DX) cooling system. In DX, the default option is Air.

Capacity section

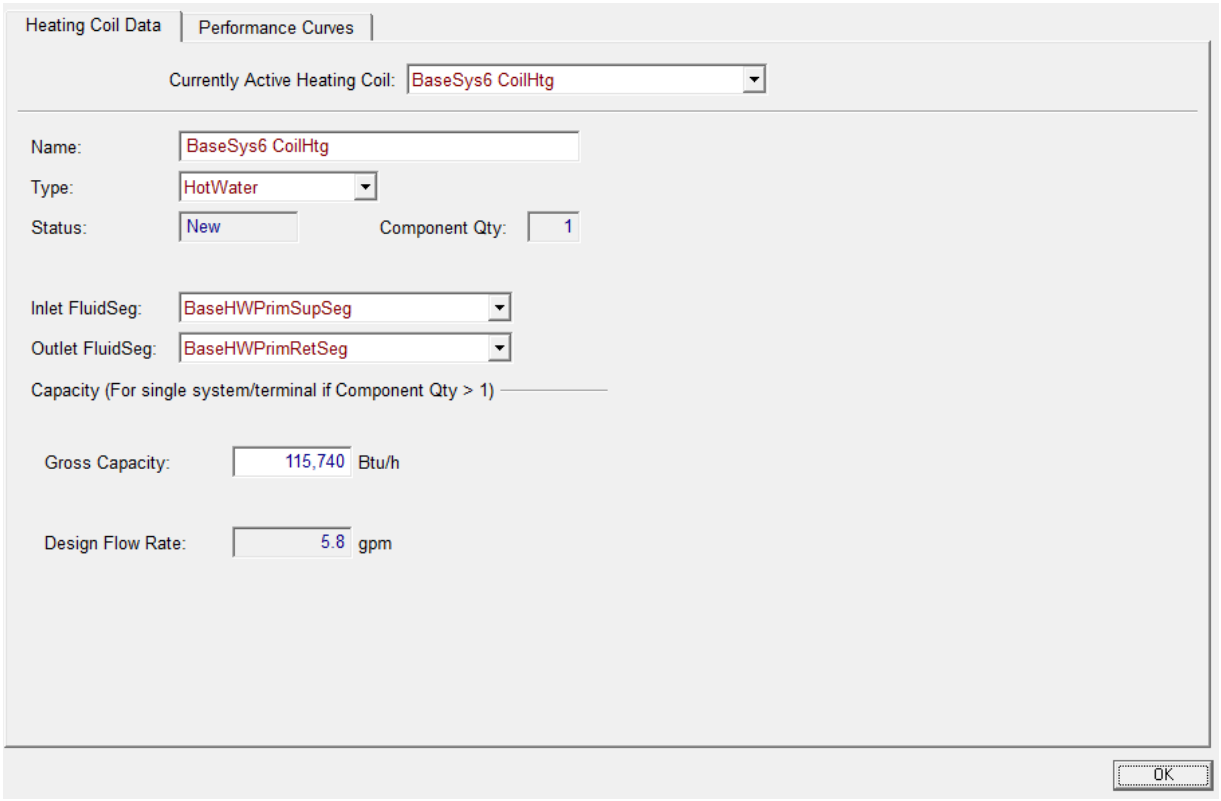
- **Num. Cooling Stages:** The number of mechanical cooling stages for a DX cooling coil. This applies to DX systems with more than one stage of DX cooling. This system is typically a packaged unit with multiple compressors and a two-speed or variable-speed fan.
- **Rated Net Capacity** (Btu/h): The net total (both sensible and latent) cooling capacity (both sensible and latent) of a cooling coil in unitary system at AHRI conditions.
  The net capacity is the total cooling capacity of the coil after adjusting for fan heat at rated conditions. The gross capacity is the total cooling capacity without adjustments for fan heat.
- **SEER** (Input): The Seasonal Energy Efficiency Ratio (SEER) is a term used to describe the seasonal performance of a DX cooling system. It is determined in accordance with AHRI standards.
- **SEER** (Code Minimum): Code Minimum SEER value.
- **EER** (Input): The cooling efficiency of a DX cooling system at AHRI rated conditions.

- **EER** (Code Minimum): Code Minimum Energy Efficiency Ratio (EER) value.
-
- .

Heating Coil Data Screen (Hot Water)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **HotWater** in the **Type** field, and click **OK**.

To access existing Heating Coil Data, double click a heating coil option (Heating Coil icon).



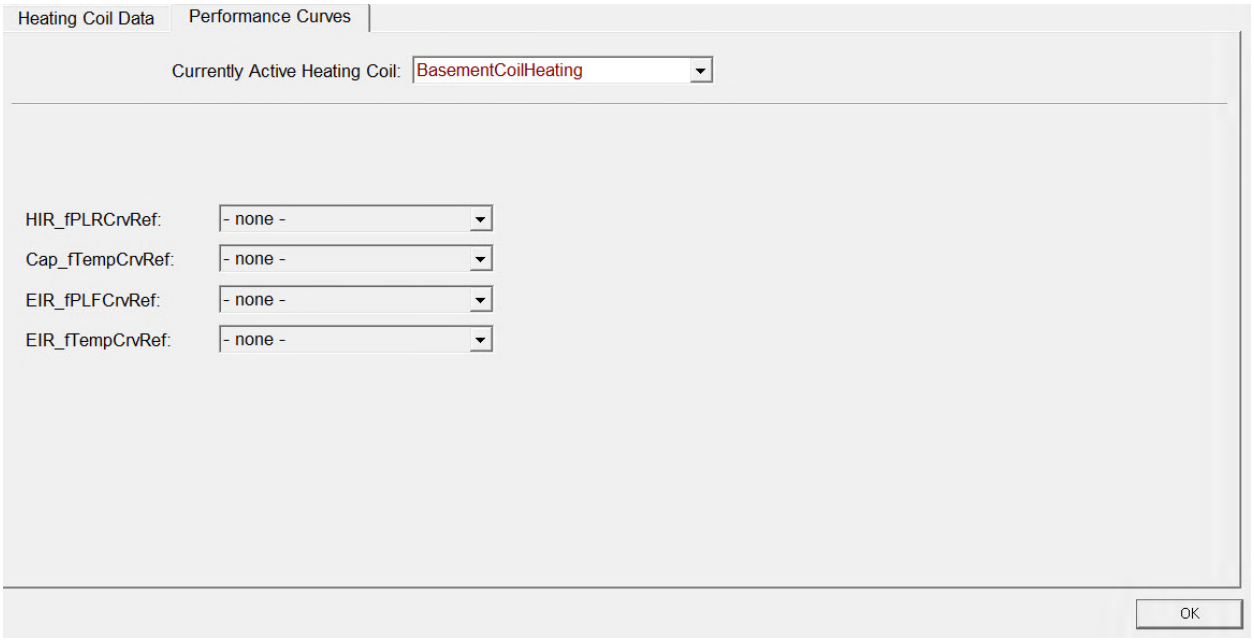
Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Inlet FluidSeg**: Defines the inlet/supply-side fluid segment of hydronic/steam coils. Options are create/import PrimarySupply FluidSegment (and apply only here), create/import SecondarySupply FluidSegment (and apply only here), BaseHWPrimSupSeg, BaseCWPrimSupSeg, BaseChWPrimSupSeg, and SHWSupply1.
- **Outlet FluidSeg:** Defines the outlet/return-side fluid segment of hydronic/steam coils. Options are create/import PrimaryReturn FluidSegment (and apply only here), create/import SecondaryReturn FluidSegement (and apply only here), BaseHWPrimRetSeg, BaseCWPrimRetSeg, and BaseChWPrimRetSeg.

Capacity (For single system/terminal if Component Qty > 1) section

- **Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.
- **Design Flow Rate** (gpm)**:** The design water volume flow rate (gpm) through the coil.

Heating Coil Data Screen (Hot Water) Performance Curves Tab



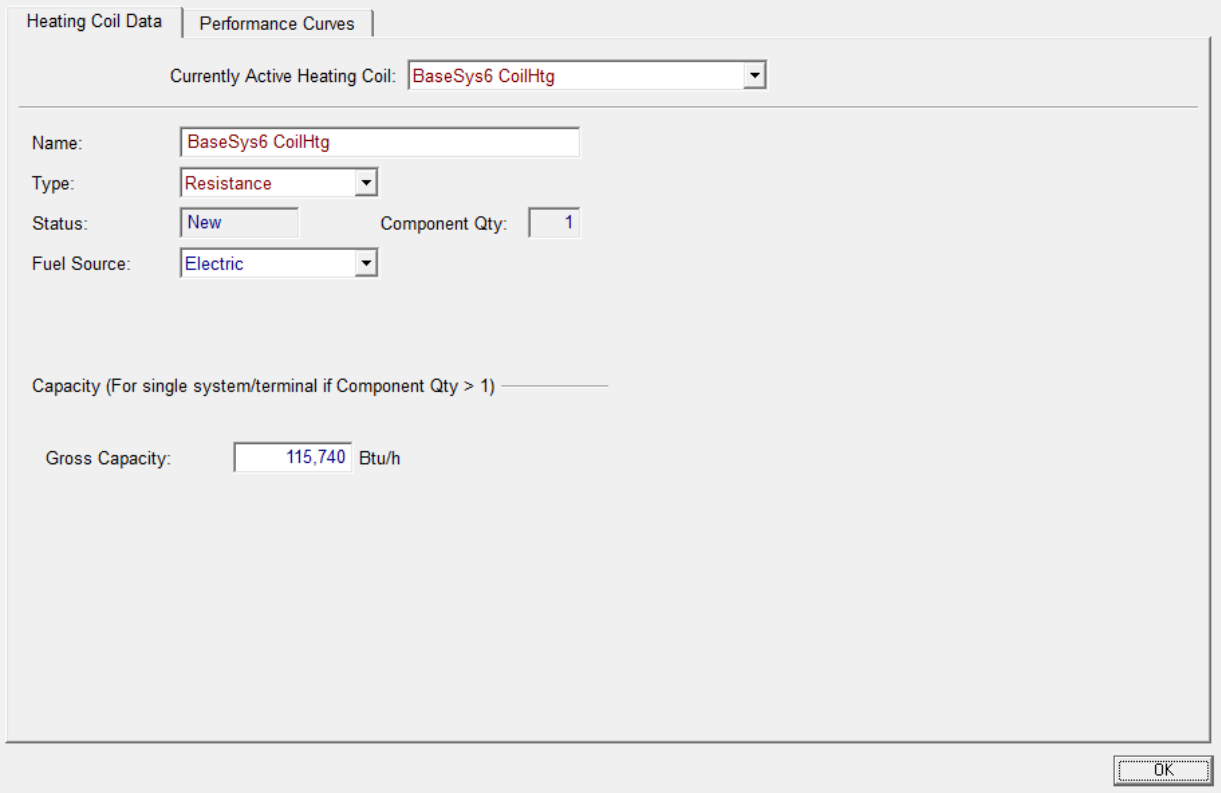
Performance Curves Tab

- **HIR_fPLRCrvRef**: Normalized curve that varies full-load efficiency as a function of part-load ratio.
- **Cap_fTempCrvRef**: A curve that describes the adjustment of a heat pump heating coil capacity as a function of temperature.
- **EIR_fPLFCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of part-load factor. This curve type is specific to EnergyPlus.
- **EIR_fTempCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil and condenser conditions.

Heating Coil Data Screen (Resistance)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **Resistance** in the **Type** field, and click **OK**.

To access existing Heating Coil Data (Resistance), double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

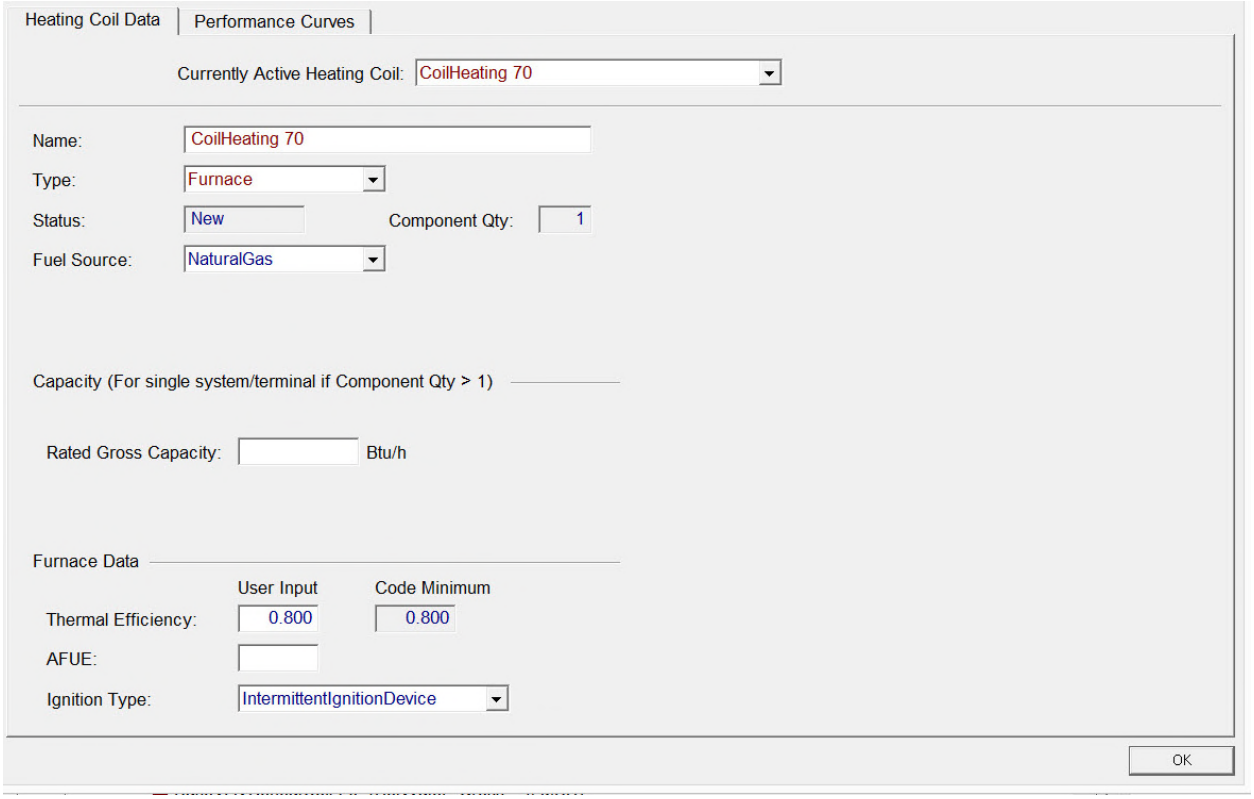
Capacity (For single system/terminal if Component Qty > 1) section

- **Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.

Heating Coil Data Screen (Furnace)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **Furnace** in the **Type** field, and click **OK**.

To access this screen, double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

Capacity (For single system/terminal if Component Qty > 1) section

- **Rated Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.

Furnace Data section

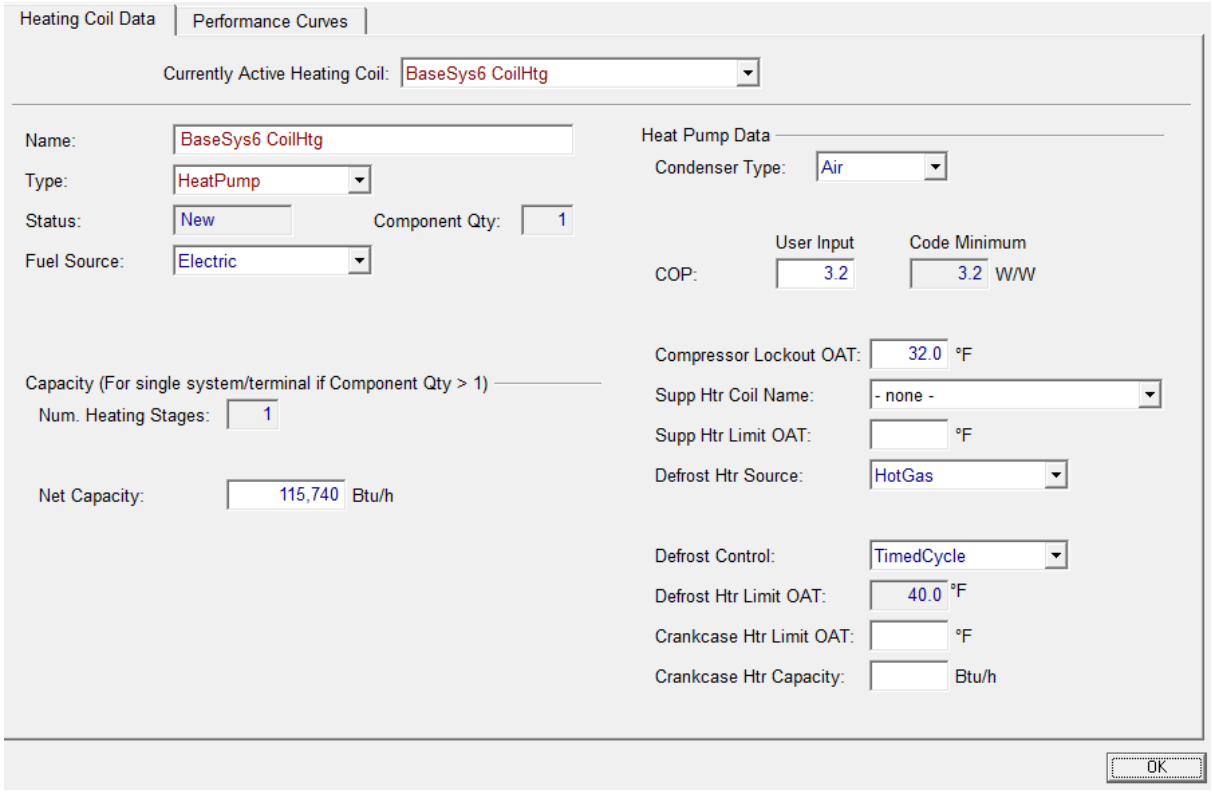
- **Thermal Efficiency (User Input):** The heating efficiency of a furnace at AHRI rated conditions.
- **Thermal Efficiency (Code Minimum):** The heating efficiency of a furnace at AHRI rated conditions at the minimum AFUE value allowed by code

- **AFUE (User Input):** The Annual Fuel Utilization Efficiency (AFUE) is an indicator of expected, seasonal furnace efficiency. It is determined in accordance with DOE Test Standards.
- **Ignition Type:** The method used to start combustion in fuel-fired furnaces. (Options are IntermittentIgnitionDevice, and PilotLight.)

Heating Coil Data Screen (Heat Pump)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **HeatPump** in the **Type** field, and click **OK**.

To access an existing Heat Pump, double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

Capacity (For single system/terminal if Component Qty > 1) section

- **Num. Heating Stages:** The number of heating stages for a furnace or heat pump heating coil. This applies to heating coils with more than one stage of heating. This system is typically a packaged unit with multiple heat pump compressors or a furnace with multiple firing rates.
- **Net Capacity** (Btu/h)**:** The net heating capacity of the coil at AHRI conditions without adjustments for fan heat. Not a user input.

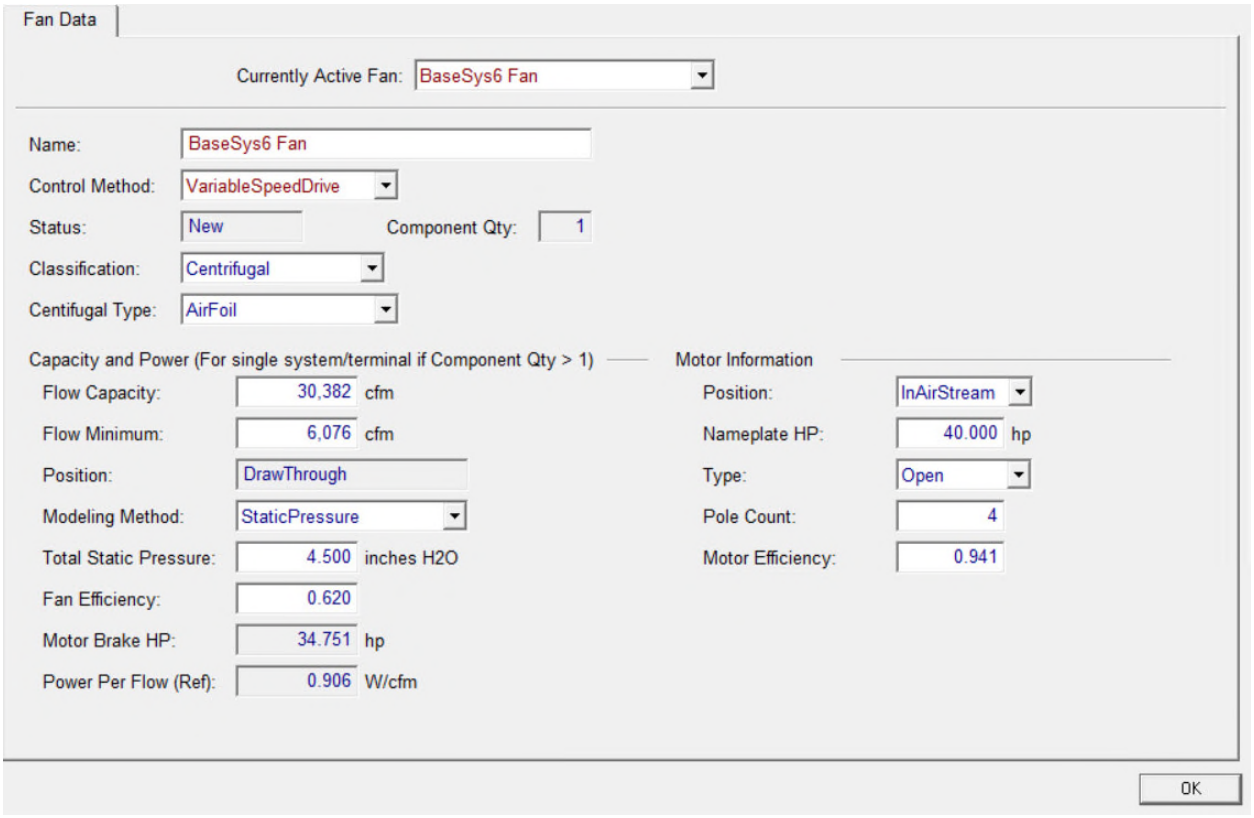
Heat Pump Data section

- **Condenser Type**: The type of condenser for heat pump heating systems. Options include Air, WaterSource, Groundwater Source and GroundSource.
- **COP** (User Input): The heating efficiency of a heat pump at AHRI-rated conditions.
- **COP** (Code Minimum): The Code minimum COP.
- **Compressor Lockout OAT** (deg F): The outside dry-bulb temperature below which the heat pump supplemental heating is allowed to operate.
- **Supp Htr Coil Name**: Select the Heating Coil.
- **Supp Htr Limit OAT**(deg F): The outside dry-bulb temperature below which the heating coil is allowed to operate.
- **Defrost Htr Source**: The fuel used for defrosting the evaporator. (Electric, HotGas)
- **Defrost Control**: Select if defrost operates at a specific time or when required. (OnDemand, TimedCycle)
- **Defrost Htr Limit OAT** (deg F): The outside dry-bulb temperature below which the defrost is allowed to operate.
- **Crankcase Htr Limit OAT** (deg F): The outside dry-bulb temperature below which the crankcase heater is allowed to operate.
- **Crankcase Htr Capacity** (Btu/h): The designed power of the crankcase heater.

Fan Data Screen

To create a new Fan, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **Fan.**

To access existing Fan data, under air system double click a fan option (Fan icon).



Input Summary:

- **Currently Active Fan**: The name of the currently selected fan.
- **Name**: The name of the fan.
- **Control Method**: Select the method used to control fan flow. Options are ConstantVolume, VariableSpeedDrive, Dampers, InletVanes and TwoSpeed.
- **Status:** The status of the system or component used for additions and alterations. Options are new and existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Classification:** Fan classification based on centrifugal or axial types.
- **Centrifugal Type**: The type of blade type used in a centrifugal fan. Options are AirFoil, BackwardInclined, ForwardCurved.

Capacity and Power (For single system/terminal if Component Qty > 1) section

- **Flow Capacity** (cfm): The design air flow rate of the fan at design conditions.

This building descriptor sets the 100 percent point for the fan part-load curve. This input should be at least as great as the sum of the design air flow specified for each of the thermal zones that are served by the fan system. For multiple deck systems, a separate entry should be made for each deck.

- **Flow Minimum** (cfm): The lowest flow rate rated for a fan.
- **Position**: The position of the supply fan relative to the cooling coil.
- **Modeling Method:** The method used to describe the design power consumption of a fan. Software commonly models fans in three ways. The simple method is for the user to enter the electric power per unit of flow (W/cfm). This method is commonly used for unitary equipment and other small fan systems. A more detailed method is to model the fan as a system whereby the static pressure, fan efficiency, part-load curve, and motor efficiency are specified at design conditions. A third method is to specify brake horsepower at design conditions instead of fan efficiency and static pressure. This is a variation of the second method whereby brake horsepower is specified in lieu of static pressure and fan efficiency. The latter two methods are commonly used for VAV and other larger fan systems.
- **Total Static Pressure:** The total static pressure drop across the fan at design conditions. The total static pressure (TSP) drop includes the pressure drop across components both internal and external to an air handler. It is important for both fan electric energy usage and fan heat gain calculations.
- **Fan Efficiency**: The efficiency of the fan at design conditions.
  Overall fan efficiency includes belt/drive and fan efficiency, but does not include the efficiency of the fan motor.
- **Motor Brake HP**: The design motor shaft brake horsepower of the fan.
  The motor brake horse power is the power at the motor shaft, including fan and drive efficiencies.
- **Power Per Flow (Ref)** (W/cfm)**:** The supply fan power, in watts, per unit of flow, in CFM

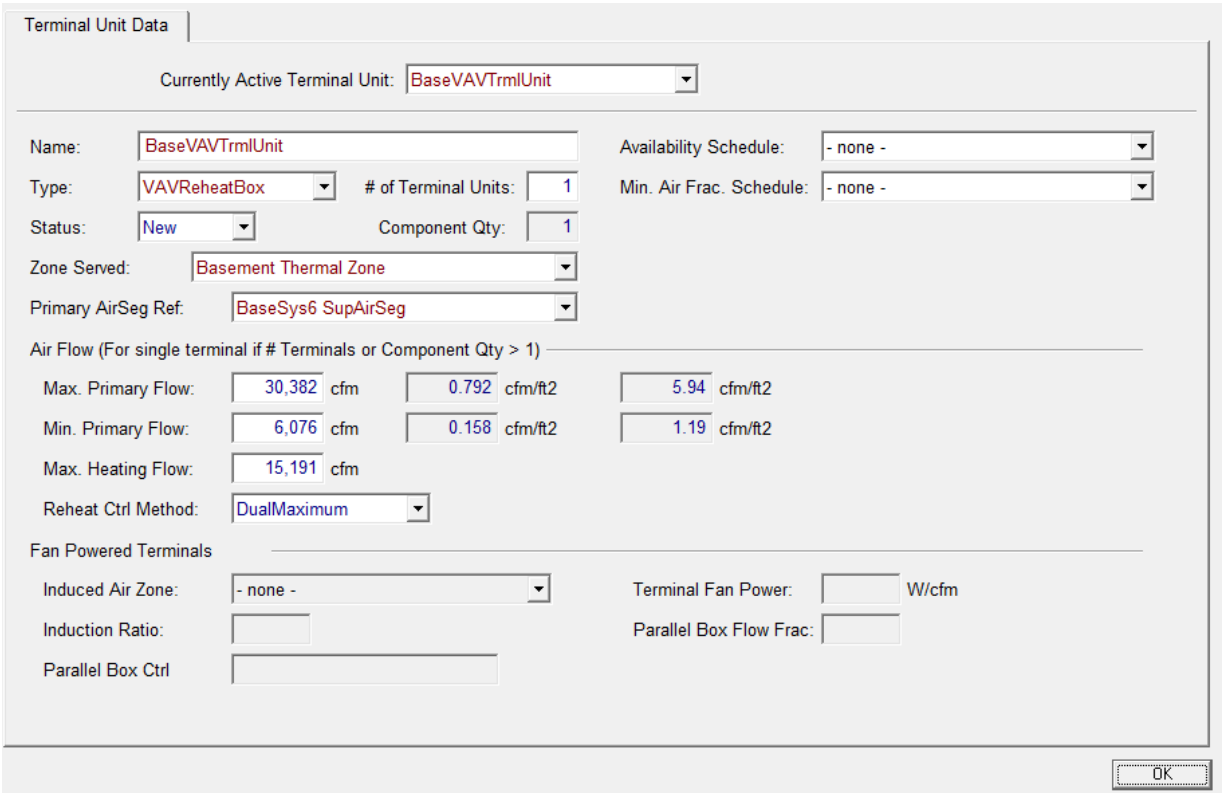
Motor Information section

- **Position**: The position of the supply fan motor relative to the cooling air stream. Options are InAirStream and NotInAirStream.
- **Nameplate HP**: The nameplate HP of the fan motor.
- **Type:** Defines if the motor is open or closed.
- **Pole Count**: The number of pole electromagnetic windings in the motor's stator and used to assign MotorEfficiency. Poles are always paired, so PoleCount is always a multiple of 2.
  Motor Efficiency: The efficiency of the motor serving a fan.

Terminal Unit Data Screen

To create a new Terminal Unit, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **Terminal Unit.**

To access this screen, double click a terminal unit option (Terminal Unit icon).


Terminal Unit Data
Currently Active Terminal Unit: BaseVAVTrmlUnit
Name: BaseVAVTrmlUnit
Availability Schedule: - none -
Type: VAVReheatBox
# of Terminal Units: 1
Min. Air Frac. Schedule: - none -
Status: New
Component Qty: 1
Zone Served: Basement Thermal Zone
Primary AirSeg Ref: BaseSys6 SupAirSeg
Air Flow (For single terminal if # Terminals or Component Qty > 1)
Max. Primary Flow: 30,382 cfm 0.792 cfm/ft2 5.94 cfm/ft2
Min. Primary Flow: 6,076 cfm 0.158 cfm/ft2 1.19 cfm/ft2
Max. Heating Flow: 15,191 cfm
Reheat Ctrl Method: DualMaximum
Fan Powered Terminals
Induced Air Zone: - none -
Terminal Fan Power: W/cfm
Induction Ratio:
Parallel Box Flow Frac:
Parallel Box Ctrl
OK

Input Summary:

- **Currently Active Terminal Unit:** The name of the currently selected terminal unit.
- **Name:** The name of the terminal unit.
- **Type**: Select the type of terminal used to deliver, and if applicable, regulate air delivery to a thermal zone. Options include Uncontrolled, VAVReheatBox, and ParallelFanBox.
- **# of Terminal Units:** The number of duplicate terminal units represented by the current terminal unit
- **Status:** Options are InAirStream and NotInAirStream. Options are New and Existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Zone Served**: Select the name of the thermal zone that the terminal unit provides air to.
- **Primary AirSeg Ref**: Select the supply air segment that provides primary air to the terminal unit.
- **Availability Schedule**: The schedule that defines when the terminal unit can operate.
- **Min**. **Air Frac. Schedule:** The schedule that defines the minimum air flow as a fraction of the total.

Air Flow (For single system/terminal if Component Qty > 1) section

- **Max. Primary Flow** (cfm/ft2): The zone air delivery rate at design conditions. For uncontrolled terminal units, describes the design air flow rate provided to zones when the system is on. For VAV systems, specifies the maximum air flow delivered to the zone by the terminal unit.
- **Min. Primary Flow** (cfm/ft2): The minimum air flow rate of variable volume terminal units
- **Max. Heating Flow** (cfm): The maximum primary air flow to the terminal in heating mode
- **Reheat Ctrl Method**: The air/temperature control strategy for VAV reheat box in heating mode. Options available are Single Maximum and Dual Maximum.
    - Single Maximum: The airflow is set to a minimum constant value in both the deadband and heating mode. The minimum airflow setpoint is typically 30 to 50 percent of maximum. This control mode typically has a higher minimum airflow than the minimum used in the dual maximum below, resulting in more frequent reheat.
    - Dual Maximum: Raises the SAT as the first stage of heating, and increases the airflow to the zone as the second stage of heating, as follows:
        - The first stage of heating consists of modulating the zone supply air temperature setpoint up to a maximum setpoint no larger than 95°F while the airflow is maintained at the deadband flow rate.
        - The second stage of heating consists of modulating the airflow rate from the deadband flow rate up to the heating maximum flow rate (50 percent of design flow rate).

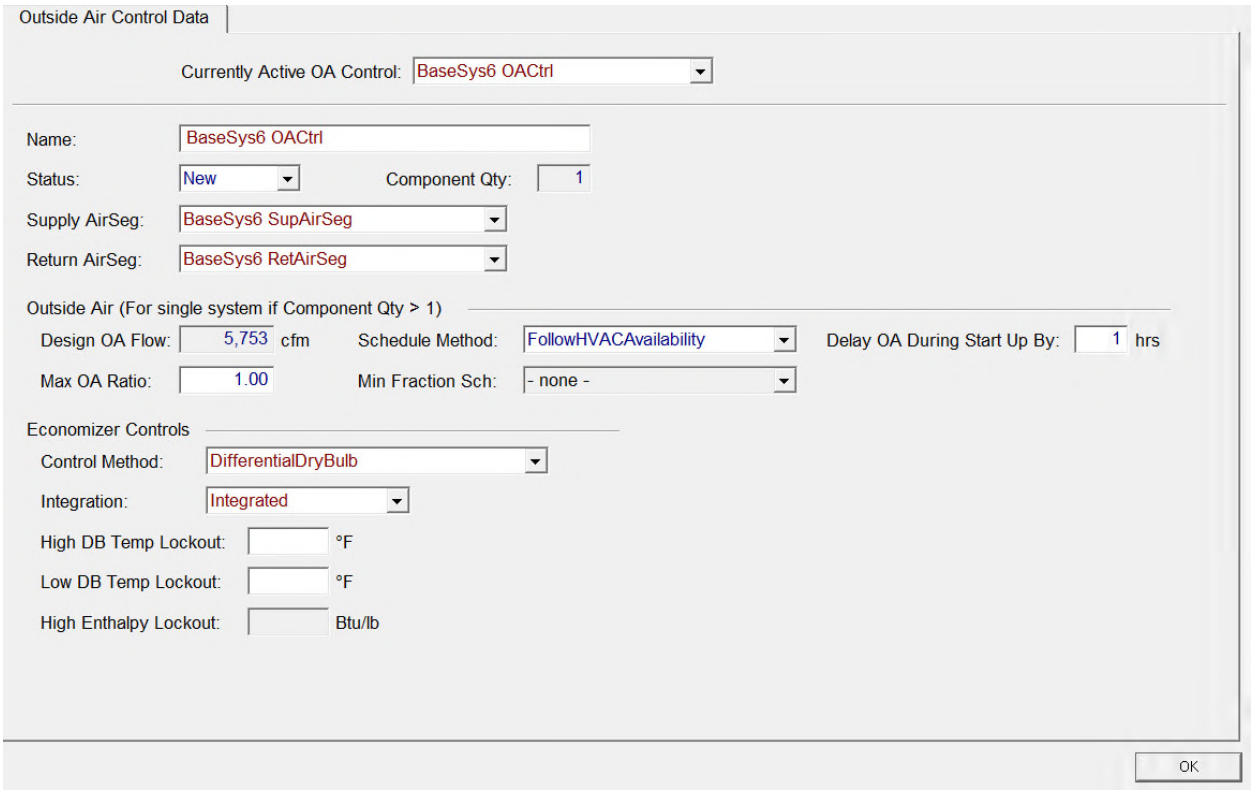
Fan Powered Terminals section (Available when selecting Type=ParallelFanBox)

- **Induced Air Zone:** Specifies the zone from which secondary air is drawn by a fan-powered box.
- **Induction Ratio:** The ration of induced secondary airflow to the total design airflow of a fan-powered box.
- **Parallel Box Ctrl:** Control method for parallel powered fan boxes.
- **Terminal Fan Power** (W/cfm)**:** The terminal unit fan power per flow.
- **Parallel Box Flow Frac:** The fraction of the primary air flow at which fan turns on. In the parallel PIU the fan operation is intermittent. If the primary air flow is above this fraction of the maximum, the fan is off.

Outside Air Control Data Screen

To create a new Outside Air Controller, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **OutsideAirControl.**

To access this screen, double click an outside air control option (Outside Air Control icon)


Outside Air Control Data
Currently Active OA Control: BaseSys6 OACtrl
Name: BaseSys6 OACtrl
Status: New
Component Qty: 1
Supply AirSeg: BaseSys6 SupAirSeg
Return AirSeg: BaseSys6 RetAirSeg
Outside Air (For single system if Component Qty > 1)
Design OA Flow: 5,753 cfm
Schedule Method: FollowHVACAvailability
Delay OA During Start Up By: 1 hrs
Max OA Ratio: 1.00
Min Fraction Sch: - none -
Economizer Controls
Control Method: DifferentialDryBulb
Integration: Integrated
High DB Temp Lockout: °F
Low DB Temp Lockout: °F
High Enthalpy Lockout: Btu/lb
OK

Input Summary:

- **Currently Active OA Control**: The name of the currently selected outdoor air control.
- **Name:** The name of the outside air control.
- **Status:** Options are new and existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Supply AirSeg**: Select the supply air segment of the Air System.
- **Return AirSeg**: Select the return/relief air segment of the Air System.

Outside Air (For single system/terminal if Component Qty > 1) section

- **Design OA Flow** (cfm): The rate of outside air that needs to be delivered by the system at design conditions. Minimum ventilation requirements specified by Standard 120(b)2 as the greater of 15 cfm/person and the minimum ventilation rates specified in Appendix 5.4. For systems serving laboratory spaces, the system shall be 100 percent outside air, with ventilation rates determined by the Authority Having Jurisdiction.

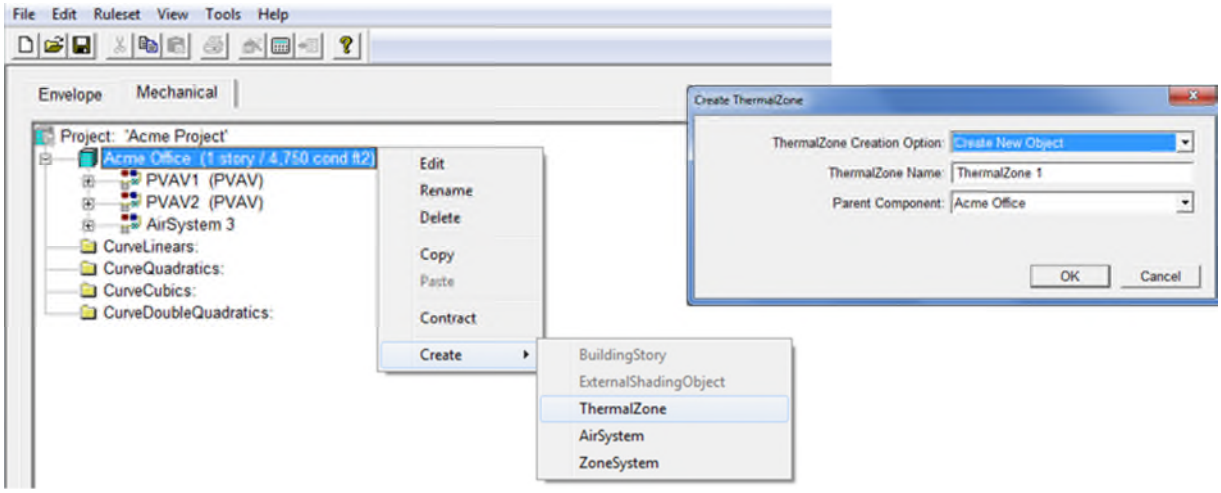
- **Schedule Method:** The method used to describe the minimum amount of ventilation (outdoor) air that is provided by the system.
- **Delay OA During Startup By**: If the OAScheduleMethod is FollowHVACAvailability, this positive integer value indicates the number of hours that the system outside air flow is zero during system start up.
- **Max OA Ratio** (For individual systems, not total if # of systems>1) Max Ratio: The maximum ratio of outside air that a system can provided, defined as a percentage of the design supply air. Applies to systems with modulating outside air dampers. Economizers for smaller systems (<54,000 Btu/h) are assumed to have a restricted intake capacity.
- **Min Fraction Sch**: A schedule that defines the minimum outdoor air flow rate as a fraction of total system air flow.

Economizer Controls section

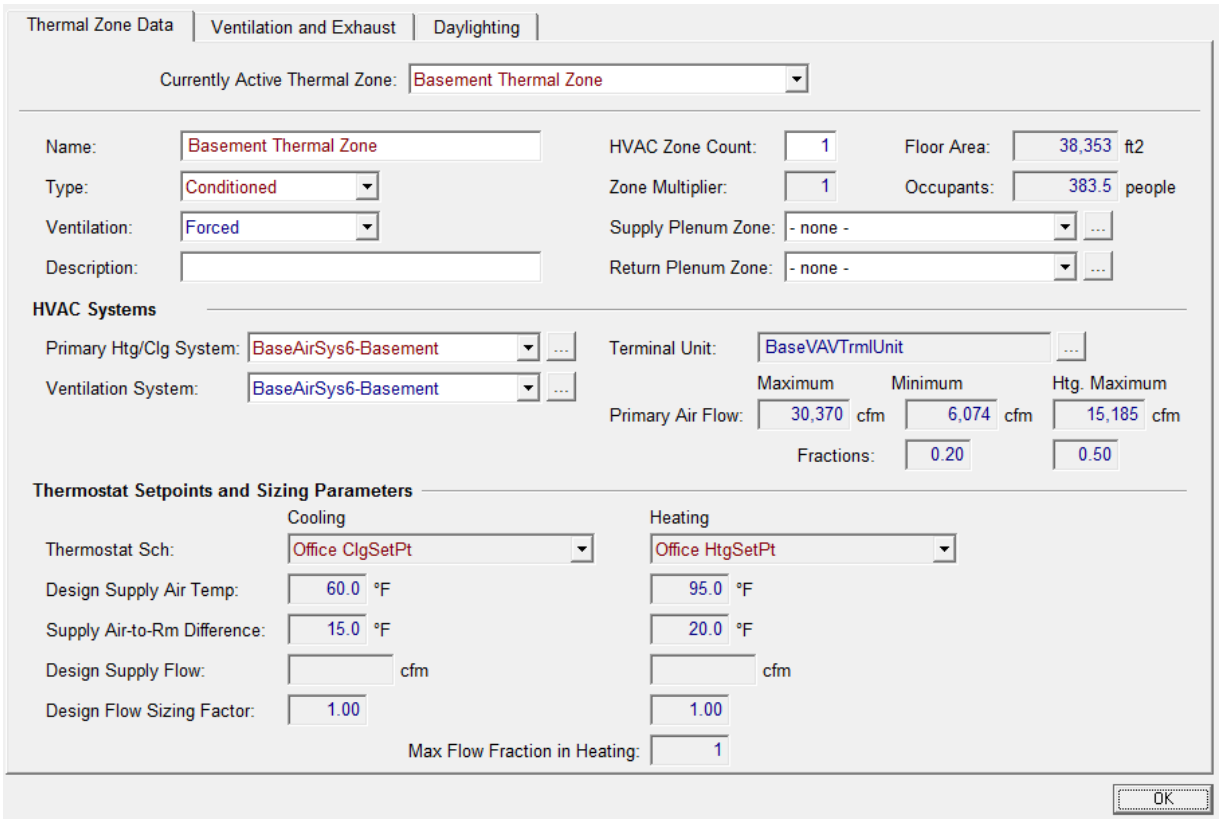
- **Control Method**: Select the method used to control the air-side economizer.
  An air-side economizer increases outside air ventilation during periods when mechanical cooling loads can be reduced by increasing outside air flow. The control types include:
  - No economizer: Fixed outside is fraction at the system's design outside air flow when the system fan runs.
  - Fixed dry-bulb: The system shifts to 100 percent outside air and shuts off the cooling when the temperature of the outside air is equal to or lower than the supply air temperature.
  - Differential dry-bulb: The system shifts to 100 percent outside air when the temperature of the outside air is lower than the return air temperature but continues to operate the cooling system until outside air temperature reaches the supply air temperature.
  - Differential enthalpy: The system shifts to 100 percent outside air when the enthalpy of the outside air is lower than the return air enthalpy but continues to operate the cooling system until the outside air enthalpy reaches the supply air enthalpy.
  - Differential enthalpy and dry-bulb: Utilizes combination of both the DifferentialDryBulb and DifferentialEnthalpy economizer control strategies.
- **Integration**: Specify whether or not the economizer is integrated with mechanical cooling. Options include:
  - NonIntegrated: The system runs the economizer as the first stage of cooling. When the economizer is unable to meet the load, the economizer returns the outside air damper to the minimum position and the compressor turns on as the second stage of cooling.
  - Integrated: The system can operate with the economizer fully open to outside air and mechanical cooling active (compressor running) simultaneously, even on the lowest cooling stage.
- **High DB Temp Lockout** (deg F): The outside air drybulb temperature above which the economizer will return to its minimum position.
- **Low DB Temp Lockout** (deg F): The outside air drybulb temperature below which the economizer will return to its minimum position.
- **High Enthalpy Lockout** (Btu/lb): The outside air drybulb temperature above which the economizer will return to its minimum position.

Thermal Zone Data Screen

To create a new Thermal Zone, in the Mechanical tab right click on Building, scroll down to **Create**, and select **ThermalZone.**



To access this screen, under Building data double click a thermal zone (Zone icon).



Input Summary:

- **Currently Active Thermal Zone**: The name of the selected thermal zone.
- **Name:** The name of the thermal zone made up of 50 or fewer alphanumeric characters.

- **Type**: Select the type of thermal zone as directly conditioned space, indirectly conditioned space (i.e., conditioned only by passive heating or cooling from an adjacent thermal zone), or plenum (i.e., unoccupied but partially conditioned as a consequence of its role as a path for returning air). Options are Conditioned, Plenum, and Unconditioned.
- **Ventilation**: Select the source of ventilation for a thermal zone. Options are, Forced, and None.
- **Description**: A brief description of the thermal zone that ties the thermal zone to the building plans. The description may identify the spaces that make up the thermal zone or can be other descriptive information.
- **HVAC Zone Count**: The number of building HVAC zones represented by the modeled thermal zone. This property is used to simulate multiples of a single thermal zone. All spaces that reference the thermal zone must have the same multiplier, and spaces with multipliers greater than one cannot be children of different Story objects. The following SDD modeling rules for Multipliers must be followed:
    1. All spaces that are combined into a thermal zone must have the same Multiplier.
    2. Spaces that are combined into a thermal zone cannot span multiple stories.
- **Zone Multiplier**: This property is used to simulate multiples of a single thermal zone. All spaces that reference the thermal zone must have the same multiplier, and thermal zones with multipliers greater than one cannot be children of different Story objects.
  The following SDD modeling rules for Multipliers must be followed:
    - All spaces that are combined into a thermal zone must have the same Multiplier.
    - Spaces that are combined into a thermal zone cannot span multiple stories.
    - All ThermalZones that are served by the same HVAC system must have the same Multiplier.
- **Floor Area** (ft2): The gross floor area of a thermal zone (before multiplier is applied); including walls and minor spaces for mechanical or electrical services such as chases that are not assigned to other thermal zones. Larger mechanical spaces and electrical rooms should not be combined.
- **Occupants:** Number of occupants.
- **Supply Plenum Zone:** The name of supply air plenum zone for the current ThermalZone.
- **Return Plenum Zone:** The name of return air plenum zone for the current ThermalZone.

HVAC Systems section

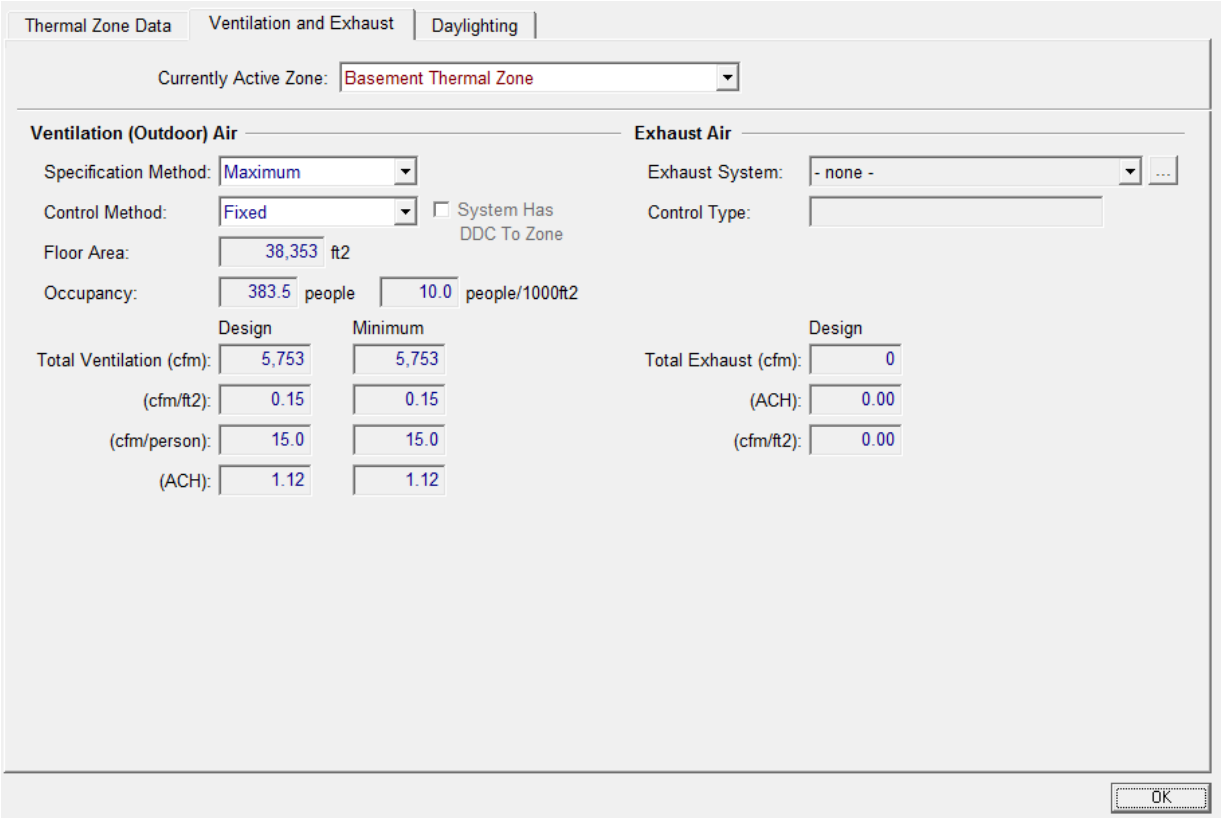
- **Primary Htg/Clg System**: The name of the air or zone system that is the principal source of heating and/or cooling for the thermal zone. Only one unique Air System can be assigned to this field.
- **Ventilation System**: The name of the air or zone system that provides ventilation air to the thermal zone. This is by default the same system as the primary air conditioning system.
- **Terminal Unit:** The name of the TerminalUnit that servers the zone.
- **Primary Air Flow (Maximum)** (cfm)**:** The maximum air flow rate of provided by the TerminalUnit that serves the zone.
- **Primary Air Flow (Minimum)** (cfm)**:** The minimum air flow rate of provided by the Terminal Unit that serves the zone. Only applicable to VAV terminal units.
- **Primary Air Flow (Htg. Maximum)** (cfm)**:** The heating maximum air flow rate of provided by the Terminal Unit that serves the zone. Only applicable to VAV terminal units.

- **Fractions (Minimum):** The fraction calculated by dividing the zone minimum primary air flow by the design (maximum) primary airflow for the zone.
- **Fractions (Htg. Maximum):** The fraction calculated by dividing the maximum primary air flow in in heating mode by the design (maximum) primary airflow for the zone.

Thermostat Setpoints and Sizing Parameters section

- **Thermostat Sch (Cooling):** HVAC zone cooling temperature schedule. The schedules specified in Appendix 5.4A and detailed in Appendix 5.4B is used as default.
- **Thermostat Sch (Heating):** HVAC zone heating temperature schedule. The schedules specified in Appendix 5.4A and detailed in Appendix 5.4B is used as default.
- **Design Supply Air Temp** (deg F): The design (cooling or heating) supply air temperature for sizing zone/system airflows.
- **Supply Air-to-Rm Difference** (deg F): The temperature difference between the (cooling or heating) supply air temperature and room air temperature used for sizing system supply fans.
- **Design Supply Flow** (cfm): The air flow provided to the thermal zone at the design (cooling or heating) condition. Applicable to sizing runs only.
- **Design Flow Sizing Factor:** A factor applied to the autosized zone cooling air flow (cooling or heating).
- **Max Flow Fraction in Heating:** The maximum supply air flow fractions during heating for sizing zone reheat coils capacity.

Thermal Zone Data (Ventilation and Exhaust Tab)



Ventilation (Outdoor) Air section

- **Specification Method**: Options are: NoVentilation, Maximum, Sum, FlowPerPerson, FlowPerArea, AirChangesPerHour, and FlowPerZone.
- **Control Method**: The method used to vary the minimum ventilation flow. Ventilation airflow may be fixed at a specified rate or it may be reduced by the use of CO2 sensors or shut off based on an occupancy sensor.
- **System Has DDC To Zone (check box):** Check box to indicate when the system has DDC to Zone.
- **Floor Area** (ft2): The gross floor area of a ThermalZone (before multiplier is applied); including walls and minor spaces for mechanical or electrical services such as chases that are not assigned to other ThermalZones. Larger mechanical spaces and electrical rooms should not be combined.
- **Occupancy**: The number of people in the ThermalZone at design occupancy.
- **Occupancy Density**: The density of people in the ThermalZone at design occupancy.
- **Total Ventilation (cfm) (Design)**: The quantity of ventilation air, per the proposed design, that is provided to the Story at design occupancy. The default value shall be the larger of 15 cfm times the design occupancy from Appendix 5.4A or the conditioned floor area times the applicable ventilation rate from Appendix 5.4A or Table 120.1-A of the Standards.
- **Total Ventilation (cfm) (Minimum)**: The minimum quantity of ventilation air, per the NACM, that must be provided to the ThermalZone at design occupancy. The default value shall be the larger of 15 cfm times the design occupancy from Appendix 5.4A or the conditioned

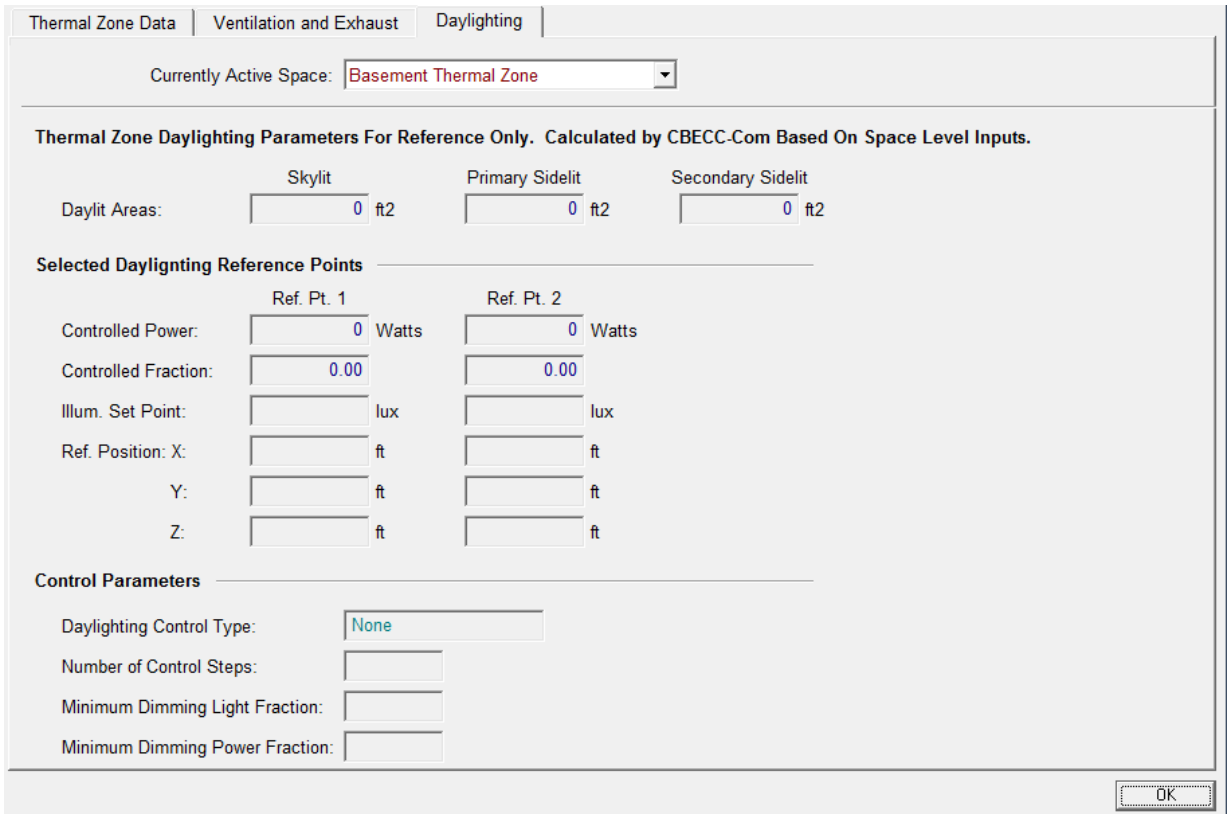
floor area times the applicable ventilation rate from Appendix 5.4A or Table 120.1-A of the Standards.

- **Total Ventilation (cfm/ft2) (Design):** The design ventilation air flow rate, in cfm/ft2, for the ThermalZone.
- **Total Ventilation (cfm/ft2) (Minimum):** The minimum ventilation air flow rate, in cfm/ft2, for the ThermalZone.
- **Total Ventilation (cfm/person) (Design):** The minimum ventilation air flow rate, in cfm/person, for the ThermalZone.
- **Total Ventilation (cfm/person) (Minimum):** The minimum ventilation air flow rate, in cfm/person, for the ThermalZone.
- **Total Ventilation (ACH) (Design):** The design air flow rate, in ACH, for the ThermalZone.
- **Total Ventilation (ACH) (Minimum):** The minimum air flow rate, in ACH, for the ThermalZone.

Exhaust Air section

- **Exhaust System:** The name of the air or zone system that exhausts air from the thermal zone. (Input is optional.)
- **Control Type:** Echo of the control method defined at exhaust system referenced by the thermal zone.
- **Total Exhaust (cfm):** The design exhaust air flow rate in cfm for the thermal zone.
- **Total Exhaust (ACH):** The design exhaust air flow rate in ACH for the thermal zone.
- **Total Exhaust (cfm/ft2):** The design exhaust air flow rate in cfm/ft2 for the thermal zone.

Thermal Zone Data (DaylightingTab)



Input Summary:

- **Currently Active Zone**: The name of the currently selected thermal zone.
- **Skylit Daylit Area** (ft2)**:** The total skylit daylit area in the thermal zone.
- **Primary Sidelit Area** (ft2)**:** The total primary sidelit daylit area in the thermal zone.
- **SecondarySidelit Area** (ft2)**:** The total secondary sidelit daylit area in the thermal zone.

Selected Daylighting Reference Points section

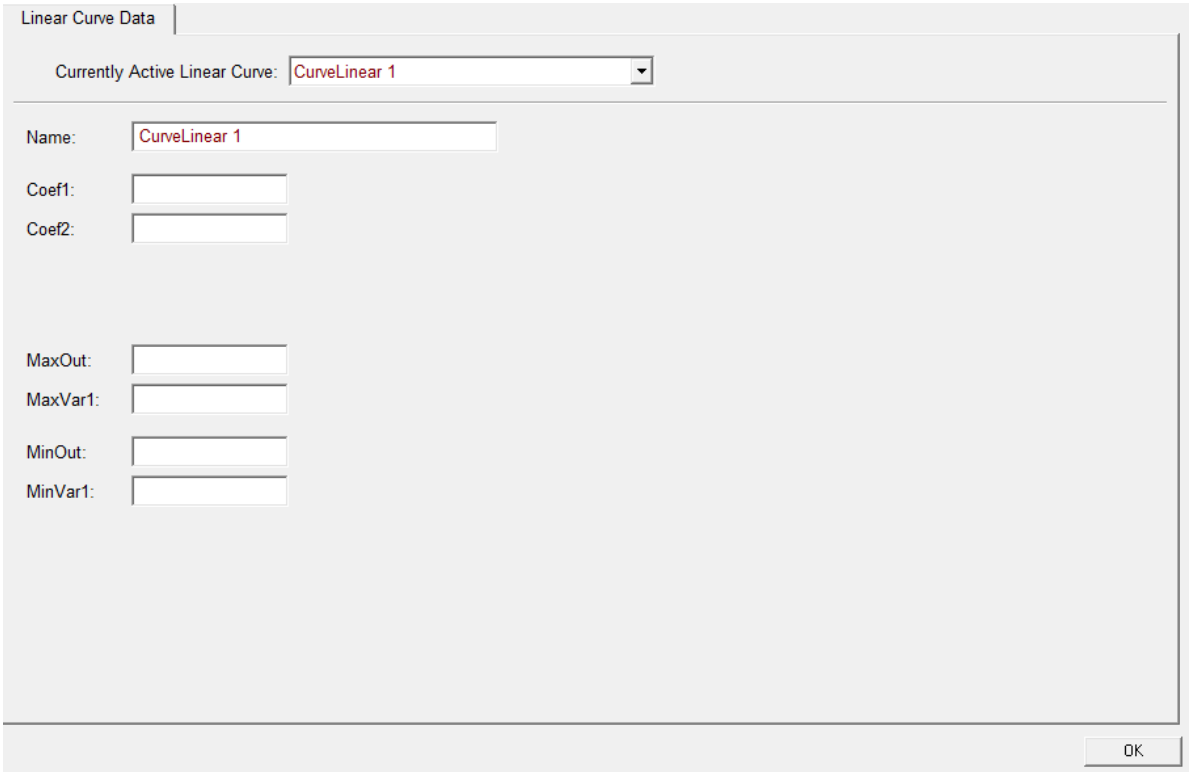
- **Controlled Power (Watts):** The total power of all controlled lighting controlled.
- **Controlled Fraction:** The fraction of total power of all controlled power controlled.
- **Illum. Set Point (lux):** The illuminance setpoint at the reference position.
- **X (ft):** The X position of the thermal daylighting reference point.
- **Y (ft):** The Y position of the thermal daylighting reference point.
- **Z (ft):** The Z position of the thermal daylighting reference point.

Controlled Parameters section

- **Daylighting Control Type:** The type of daylighting control.
- **Number of Control Steps:** The number of control steps.
- **Minimum Dimming Lighting Fraction:** The power fraction at minimum dimming.
- **Minimum Dimming Power Fraction:** The lighting fraction at minimum dimming.

Linear Curve Data Screen

To access this screen, right click **CurveLinears**. Select **Create** and then **CurveLinear**. The **Create CurveLinear** dialog box appears. Enter the **CurveLinear Name** and click **OK**.



The linear curve consists of two coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef2 * Var1

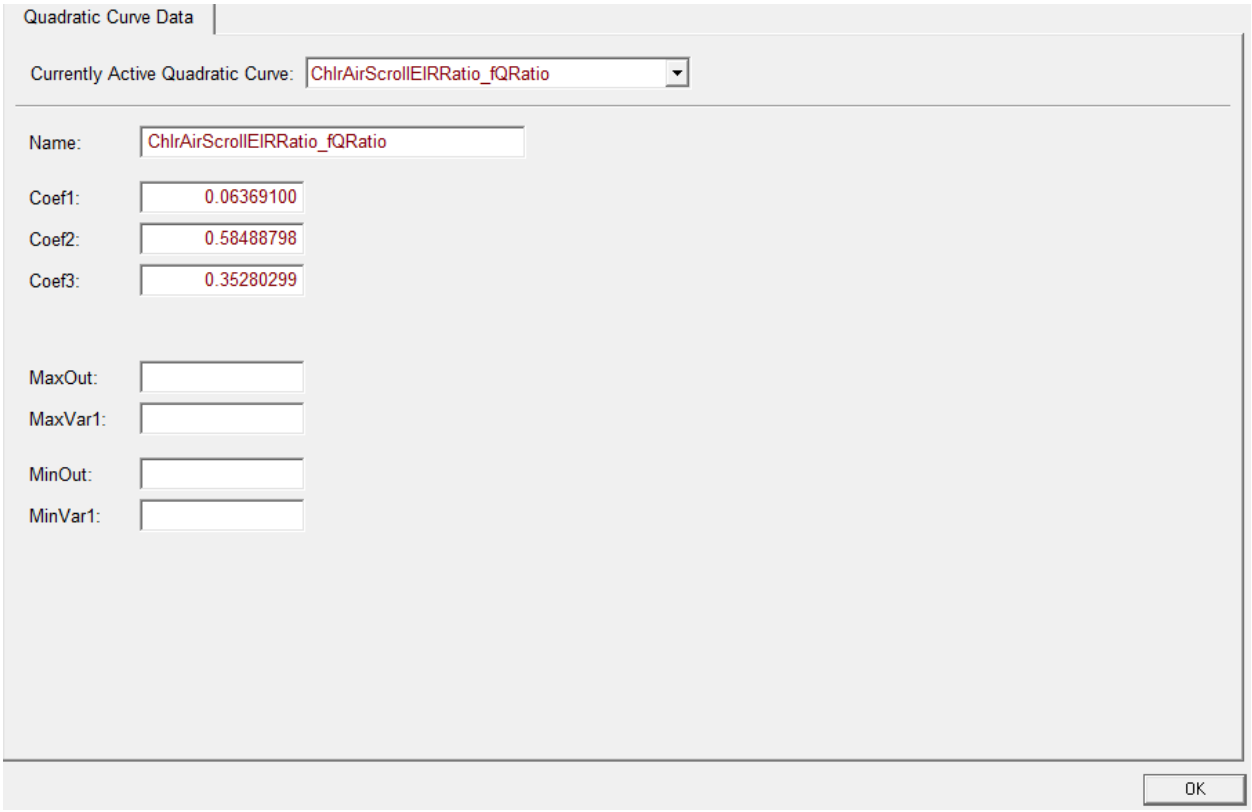
Input Summary:

- **Currently Active Linear Curve**: The name of the selected linear curve.
- **Name**: The name of the linear curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.

- **MaxOut:** The maximum allowable output value. (optional)
- **MaxVar1:** The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the independent variable.

Quadratic Curve Data Screen

To access this screen, right click **CurveQuadratic**. Select **Create** and then **CurveQuadratic**. The **Create CurveQuadratic** dialog box appears. Enter the **CurveQuadratic Name** and click **OK**.



The quadratic curve consists of three coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef2 * Var1 + Coef3 * Var1 ^ 2

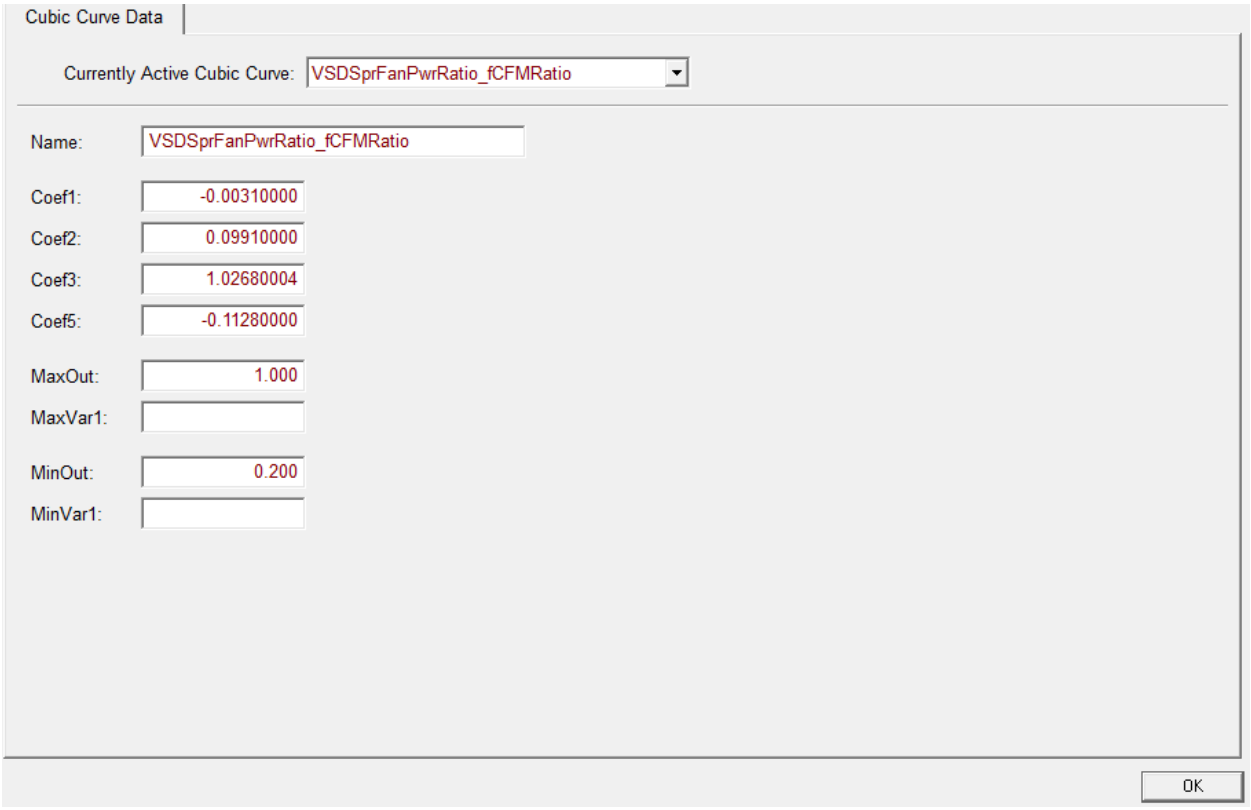
Input Summary:

- **Currently Active Quadratic Curve:** The name of the active quadratic curve.
- **Name:** The name of the quadratic curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.
- **Coef3**: The quadratic coefficient in the equation.

- **MaxOut:** The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the independent variable.

Cubic Curve Data Screen

To access this screen, right click **CurveCubic**. Select **Create** and then **CurveCubic**. The **Create CurveCubic** dialog box appears. Enter the **CurveCubic Name** and click **OK**.



The cubic curve consists of four coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

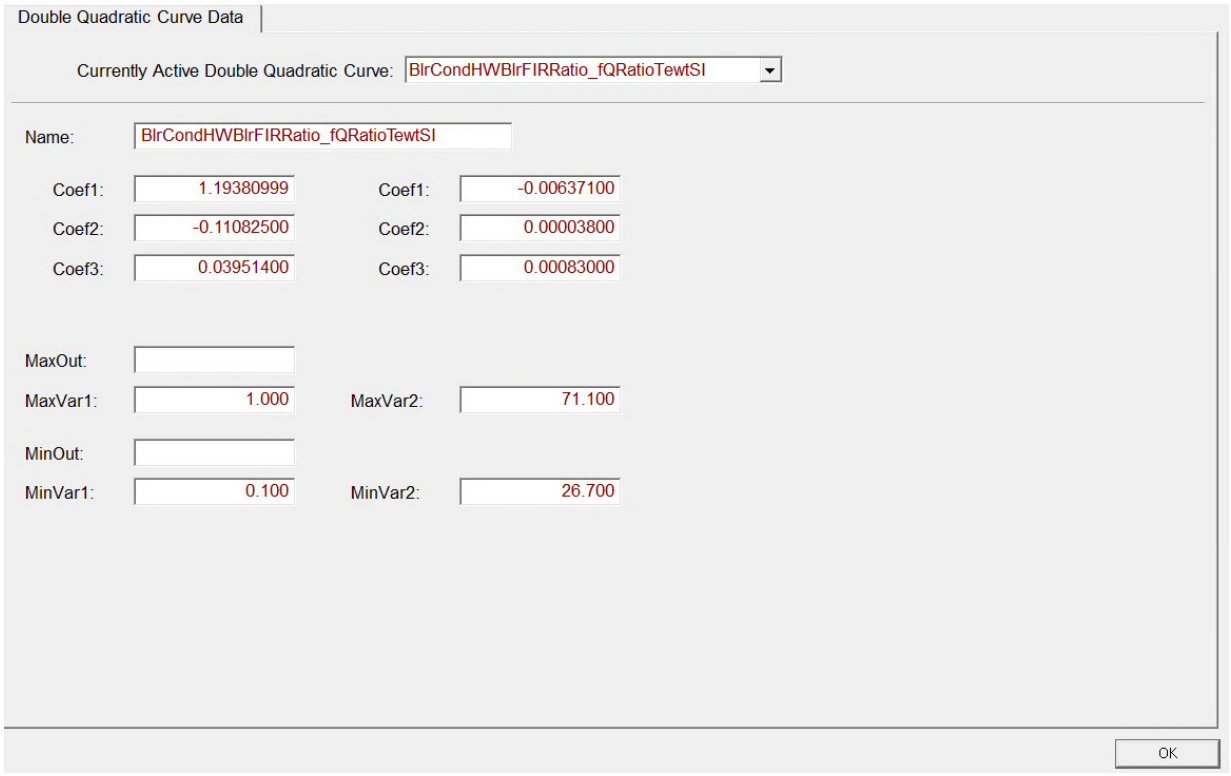
Out = Coef1 + Coef2 * Var1 + Coef3 * Var1 ^ 2 + Coef5 * Var1 ^ 2

Input Summary:

- **Currently Active Cubic Curve:** The name of the active cubic curve.
- **Name**: The name of the cubic curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.
- **Coef3**: The quadratic coefficient in the equation.
- **Coef5**: The cubic coefficient in the equation.
- **MaxOut**: The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1:** The minimum allowable value for the independent variable.

Double Quadratic Curve Data Screen

To access this screen, right click **CurveDoubleQuadratic**. Select **Create** and then **CurveDoubleQuadratic**. The **Create CurveDoubleQuadratic** dialog box appears. Enter the **CurveDoubleQuadratic Name** and click **OK**.



The double quadratic curve consists of two independent variables and three coefficients for each variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef1 + Coef2 * Var1 + Coef2 * Var2 + Coef3 * Var1 ^ 2 + Coef3 * Var2 ^ 2

Input Summary:

- **Currently Active Double Quadratic Curve**: The name of the active double quadratic curve.
- **Name:** The name of the double quadratic curve.
- **Coef1:** The constant coefficient in the equation.
- **Coef2:** The linear coefficient in the equation.
- **Coef3:** The quadratic coefficient in the equation.

- **MaxOut**: The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the first independent variable.
- **MaxVar2**: The maximum allowable value for the second independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the first independent variable.
- **MinVar2**: The minimum allowable value for the second independent variable.

SPECIAL FEATURES AND MODELING ASSUMPTIONS

The *ACM Reference Manual* contains requirements for Special Documentation and Reporting, many of which are implemented in CBECC-Com v3c.

The following modeling assumptions are made by CBECC-Com.

Modeling Assumptions

- CBECC-Com uses the concept of three parallel sets of input for a single building modeled for compliance.
    1. The user model is the set of inputs entered by the user that reflect the actual specification of the as-designed building.
    2. The proposed model is generated by the software and applies modeling constraints to user inputs, when needed, for use in compliance. Values of prescribed inputs such as schedules or equipment power density are overridden with inputs to follow the rules in the *ACM Reference Manual.*
    3. The standard design model is the baseline for comparison.
- The CBECC software applies modeling concepts to identify building model inputs that can be modified by the user from those that cannot.
    - A prescribed input is a modeling input that is fixed for both the proposed design and the standard design (baseline). Examples of prescribed inputs are occupancy schedules and equipment power density (EPD) for a given space type.
    - A neutral input is a modeling input that is entered by the user, but the value for the standard design (baseline) is set by the software to match the user input. Examples of this type of input include climate zone, and the building geometry (excluding fenestration).
    - A user-defined input is a modeling input that is entered by the user, whose value is allowed to vary above or below the stringency level in the standard design. Examples of this type of input include lighting power and HVAC equipment efficiency.
- The modeling rules and input restrictions are defined in detail in the *ACM Reference Manual*, available on the California Energy Commission website.
- While most algorithms are handled automatically by the software, the CBECC software employs a calculation algorithm for recirculating water heating systems in multi-family water heating. Refer to Residential ACM Appendix RE for calculation details.
- While refrigeration systems are not modeled explicitly in the CBECC software, there is a means to specify the refrigeration capacity (Btu/h) and the location of the condenser (remote or in the space). CBECC assumes a fixed COP of 2.8 to calculate the heat rejection for condensers that are not located remotely. Refrigeration for modeling purposes is considered a “neutral” load—the same value is used in the proposed design and standard design model.

FIELD VERIFICATION

The following list of features must be verified in the field.

- NRFC rating for Fenestration.
- Thermal performance of Window Films. For details refer to NA7 of 2013 Nonresidential Appendices.
- Thermal performance of Dynamic Glazing. For details refer to NA7 of 2013 Nonresidential Appendices.
- Lighting Controls installed to earn a Power Adjustment Factor (PAF) in accordance with Section 140.6(a) 2. For details refer to NA7 of 2013 Nonresidential Appendices.
- Lighting for a Videoconferencing Studio in accordance with Exception to Section 140.6(a) 3T. For details refer to NA7 of 2013 Nonresidential Appendices.
- Kitchen Exhaust Systems with Type I Hood Systems. For details refer to NA7 of 2013 Nonresidential Appendices.
- Fault Detection and Diagnostic Systems—this is a mandatory feature for systems with capacity of 54,000 Btu/h and above.
- DHW Distribution Diagnostic Testing—Duct System Leakage Diagnostic Testing—Duct leakage testing for systems serving less than 5,000 ft2 of space that have ducts in unconditioned space. Refer to NA2 for field test details. To claim the prescriptive required leakage level (6%) or lower, the tests in Reference Appendix NA2 must be completed. Otherwise, a higher default level is assumed in the compliance model.
- Low Leakage Air-handling Unit verification.

CHECKLIST FOR COMPLIANCE SUBMITTAL

CBECC-Com will produce the Certificate of Compliance for the Nonresidential Performance Compliance Method, NRCC-PRF-01-E, which meets the requirements of a compliance submittal.

For more information regarding compliance submittals and tools to determine what forms apply to your project visit http://energycodeace.com/content/home/.

Note: Please check the Compliance Statement section to make sure that the version you are using has been certified by the California Energy Commission to show compliance with California's 2013 Building Energy Efficiency Standards.

COMPLIANCE STATEMENT

CBECC-Com 2013-v3c may be used to show compliance with California's 2013 Building Energy Efficiency Standards.

RELATED PUBLICATIONS

The following documents provide the basis for compliance with the 2013 Standards:

2013 Building Energy Efficiency Standards (http://www.energy.ca.gov/2012publications/CEC-400-2012-004/CEC-400-2012-004-CMF-REV2.pdf)

2013 Nonresidential Alternate Calculation Method Reference Manual (http://www.energy.ca.gov/2013publications/CEC-400-2013-004/CEC-400-2013-004-CMF.pdf)

2013 Nonresidential Compliance Manual (http://www.energy.ca.gov/2013publications/CEC-400-2013-002/CEC-400-2013-002-CMF-REV.pdf)

2012 Appliance Efficiency Regulations (http://www.energy.ca.gov/2012publications/CEC-400-2012-019/CEC-400-2012-019-CMF.pdf)

Reference Nonresidential Appendices (http://www.energy.ca.gov/2012publications/CEC-400-2012-005/CEC-400-2012-005-CMF.pdf)

Reference Joint Appendices (http://www.energy.ca.gov/2012publications/CEC-400-2012-005/CEC-400-2012-005-CMF.pdf)

SAMPLE COMPLIANCE DOCUMENTATION
EXAMPLE BUILDING A

Project Name:	General_Section - Report	NRCC-PRF-01-E	Page 1 of 23
Project Address:	120 Acme Street Sacramento 95814	Calculation Date/Time:	17:41, Thu, Jun 25, 2015
Compliance Scope:	NewComplete	Input File Name:	General_Section - Report_v3c_fixed.cibd

A. PROJECT GENERAL INFORMATION

1.	Project Location (city)	Sacramento	**7.**	# of dwelling units	0
2.	CA Zip Code	95814	**8.**	Compliance Software (version)	CBECC-Com 2013-3c (759)
3.	Climate Zone	12	**9.**	Building Orientation (deg)	(N) 0 deg
4.	Total Conditioned Floor Area	58,628 ft^2	**10.**	Permitted Scope of Work	NewComplete
5.	Total Unconditioned Floor Area	0 ft^2	**11.**	Building Type(s)	Relocatable Public School Building
6.	# of Stories (Habitable Above Grade)	3			

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS **§ 140.1**

BUILDING COMPLIES

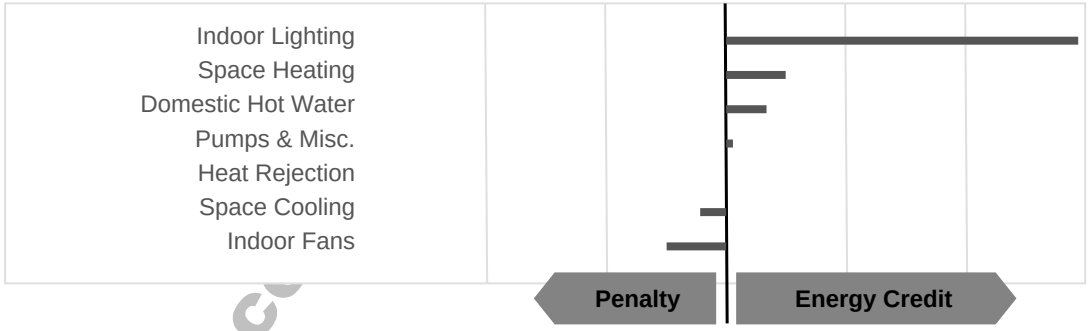
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard
Space Heating	11.5	10.3	1.2	10.4%
Space Cooling	65.6	66.1	-0.5	-0.8%
Indoor Fans	19.9	21.1	-1.2	-6.0%
Heat Rejection	--	--	--	--
Pumps & Misc.	0.7	0.6	0.1	14.3%
Domestic Hot Water	4.0	3.2	0.8	20.0%
Indoor Lighting	43.7	36.4	7.3	16.7%
COMPLIANCE TOTAL	**145.4**	**137.7**	**7.7**	**5.3%**
Receptacle	109.8	109.8		0.0%
Process	--	--		--
Process Ltg	--	--		--
TOTAL	**255.2**	**247.5**		**3.0%**

Not useable for compliance

C. PRIORITY PLAN CHECK/ INSPECTION ITEMS (in order of highest to lowest TDV energy savings)

1st	Indoor Lighting: Check lighting
2nd	Space Heating: Check envelope and mechanical
3rd	Domestic Hot Water: Check mechanical
4th	Pumps & Misc.: Check mechanical
5th	Heat Rejection: Check envelope and mechanical
6th	Space Cooling: Check envelope and mechanical
7th	Indoor Fans: Check envelope and mechanical

Compliance Margin By Energy Component (from Table B column 4)



D. EXCEPTIONAL CONDITIONS

The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.

The proposed building includes spaces without cooling equipment, but cooling equipment has been added to the model, presumably to meet unmet load hour requirements. Verify that the performance parameters of the added equipment are minimally compliant.

The compliance model includes HVAC equipment with capacities that differ from the building plans, presumably to meet unmet load hour requirements. Verify that the equipment in the design provides adequate cooling and heating capacity for the spaces served.

Significant modeling approximations have been used to represent the building design. Such approximations are common and an expected part of energy modeling. However, such approximations should have thermodynamically similar results in the model and in the completed building. Ensure that a narrative has been provided. Review the narrative and ensure the modeling approximations are appropriate. Some approximations may not be appropriate. In such cases, the Exceptional Design Compliance procedure should be used. An example would be modeling of thermal storage by modifying the efficiency of heating and cooling equipment

E. HERS VERIFICATION

This Section Does Not Apply

F. ADDITIONAL REMARKS

Narrative for Office Medium Simplified Geometry

trqrerwqy6tryuqwgtr uywgrrywuierywe iuhytuieiutye terio erteriteriture o
e8urtyetyeirutyeritr ioetrertioetuioerute toi etueoitueoit eoiitjertoeotju

Not useable for compliance

G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

Identify which building components use the performance or prescriptive path for compliance. "NA"= not in project

For components that utilize the performance path, indicate the sheet number that includes mandatory notes on plans.

Building Component	Compliance Path		Compliance Forms *(required for submittal)*	Location of Mandatory Notes on Plans
Envelope	☐	Performance	NRCC-PRF-ENV-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-ENV-01 / 02 / 03 / 04 / 05 / 06-E	
	☐	NA		
Mechanical	☐	Performance	NRCC-PRF-MCH-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-MCH-01 / 02 / 03 / 04 / 05 / 06 / 07-E	
	☐	NA		
Domestic Hot Water	☐	Performance	NRCC-PRF-PLB-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-PLB-01-E	
	☐	NA		
Lighting (Indoor Conditioned)	☐	Performance	NRCC-PRF-LTI-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-LTI-01 / 02 / 03 / 04 / 05-E	
	☐	NA		
Covered Process: Commercial Kitchens	☐	Performace	S2 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 03-E	
	☐	NA		
Covered Process: Computer Rooms	☒	Performance	S3 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 04-E	
	☐	NA		
Covered Process: Laboratory Exhaust	☒	Performace	S4 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 09-E	
	☐	NA		

Not useable for compliance

G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

The following building components are only eligible for prescriptive compliance. Indicate which are relevant to the project.

Yes	NA	Prescriptive Requirement	Compliance Forms
☒	☐	Lighting (Indoor Unconditioned) §140.6	NRCC-LTI-01 / 02 / 03 / 04 / 05-E
☐	☐	Lighting (Outdoor) §140.7	NRCC-LTO-01 / 02 / 03-E
☒	☐	Lighting (Sign) §140.8	NRCC-LTS-01-E
☐	☐	Solar Thermal Water Heating: §140.5	NRCC-STH-01-E

The following building components may have mandatory requirements per Part 6. Indicate which are relevant to the project.

Yes	NA	Mandatory Requirement	Compliance Forms
		Commissioning: §120.8	
☐	☒	Simple Systems	NRCC-CXR-01 / 02 / 03 / 05-E
☒	☐	Complex Systems	NRCC-CXR-01 / 02 / 04 / 05-E
☒	☐	Electrical: §130.5	NRCC-ELC-01-E
☐	☐	Solar Ready: §110.10	NRCC-SRA-01 / 02-E
		Covered Process: §120.6	NRCC-PRC-01-E
☒	☐	Parking Garage	NRCC-PRC-02-E
☐	☐	Commercial Refrigeration	NRCC-PRC-05-E
☐	☐	Warehouse Refrigeration	NRCC-PRC-06/07/08-E
☒	☐	Compressed Air	NRCC-PRC-10-E
☒	☐	Process Boilers	NRCC-PRC-11-E

Not useable for compliance

H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.		**Confirmed**	
Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Envelope	☒ NRCI-ENV-01-E - For all buildings	☐	☐
	☒ NRCA-ENV-02-F- NFRC label verification for fenestration	☐	☐
Mechanical	☒ NRCI-MCH-01-E - For all buildings with Mechanical Systems	☐	☐
	☒ NRCA-MCH-02-A- Outdoor Air	☐	☐
	☒ NRCA-MCH-03-A – Constant Volume Single Zone HVAC	☐	☐
	☒ NRCA-MCH-04-H- Air Distribution Duct Leakage	☐	☐
	☒ NRCA-MCH-05-A- Air Economizer Controls	☐	☐
	☒ NRCA-MCH-06-A- Demand Control Ventilation	☐	☐
	☒ NRCA-MCH-07-A – Supply Fan Variable Flow Controls	☐	☐
	☒ NRCA-MCH-08-A- Valve Leakage Test	☐	☐
	☒ NRCA-MCH-09-A – Supply Water Temp Reset Controls	☐	☐
	☒ NRCA-MCH-10-A- Hydronic System Variable Flow Controls	☐	☐
	☒ NRCA-MCH-11-A – Auto Demand Shed Controls	☐	☐
	☒ NRCA-MCH-12-A- Packaged Direct Expansion Units	☐	☐
	☒ NRCA-MCH-13-A- Air Handling Units and Zone Terminal Units	☐	☐
	☒ NRCA-MCH-14-A- Distributed Energy Storage	☐	☐
	☒ NRCA-MCH-15-A – Thermal Energy Storage	☐	☐
	☒ NRCA-MCH-16-A- Supply Air Temp Reset Controls	☐	☐
	☒ NRCA-MCH-17-A – Condensate Water Temp Reset Controls	☐	☐
	☒ NRCA-MCH-18-A- Energy Management Controls Systems	☐	☐
	☒ NRCV-MCH-04-H- Duct Leakage Test	☐	☐

Not useable for compliance

H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.		**Confirmed**	
Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Plumbing	☒ NRCI-PLB-01-E - For all buildings with Plumbing Systems	☐	☐
	☒ NRCI-PLB-02-E - required on central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-03-E - Single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-21-E - HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-22-E - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCV-PLB-21-H- HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCV-PLB-22-H - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-STH-01-E - Any solar water heating	☐	☐
Indoor Lighting	☒ NRCI-LTI-01-E - For all buildings	☐	☐
	☒ NRCI-LTI-02-E - Lighting control system, or for an Energy Management Control System (EMCS)	☐	☐
	☒ NRCI-LTI-03-E - Line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting	☐	☐
	☒ NRCI-LTI-04-E - Two interlocked systems serving an auditorium, a convention center, a conference room, or a theater	☐	☐
	☒ NRCI-LTI-05-E - Lighting Control Credit Power Adjustment Factor (PAF)	☐	☐
	☒ NRCI-LTI-06-E - Additional wattage installed in a video conferencing studio	☐	☐
	☒ NRCA-LTI-02-A - Occupancy sensors and automatic time switch controls.	☐	☐
	☒ NRCA-LTI-03-A - Automatic daylighting controls	☐	☐
	☒ NRCA-LTI-04-A - Demand responsive lighting controls	☐	☐
Outdoor Lighting	☒ NRCI-LTO-01-E – Outdoor Lighting	☐	☐
	☐ NRCI-LTO-02-E- EMCS Lighting Control System	☐	☐
	☒ NRCA-LTO-02-A - Outdoor Lighting Control	☐	☐
Sign Lighting	☒ NRCI-LTS-01-E – Sign Lighting	☐	☐
Electrical	☒ NRCI-ELC-01-E - Electrical Power Distribution	☐	☐
Photovoltaic	☒ NRCI-SPV-01-E Photovoltaic Systems	☐	☐

Not useable for compliance

H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.		**Confirmed**	
Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Covered Process	☒ NRCI-PRC-01-E Refrigerated Warehouse	☐	☐
	☒ NRCA-PRC-01-F- Compressed Air Systems	☐	☐
	☒ NRCA-PRC-02-F- Kitchen Exhaust	☐	☐
	☒ NRCA-PRC-03-F- Garage Exhaust	☐	☐
	☒ NRCA-PRC-04-F- Refrigerated Warehouse- Evaporator Fan Motor Controls	☐	☐
	☒ NRCA-PRC-05-F- Refrigerated Warehouse- Evaporative Condenser Controls	☐	☐
	☒ NRCA-PRC-06-F- Refrigerated Warehouse- Air Cooled Condenser Controls	☐	☐
	☒ NRCA-PRC-07F- Refrigerated Warehouse- Variable Speed Compressor	☐	☐
	☒ NRCA-PRC-08-F- Electrical Resistance Underslab Heating System	☐	☐

I. ENVELOPE GENERAL INFORMATION (See NRCC-PRF-ENV-DETAILS for more information)

						Confirmed	
1.	Total Conditioned Floor Area	58,628 ft²	**5.**	Number of Floors Above Grade	3		
2.	Total Unconditioned Floor Area	0 ft²	**6.**	Number of Floors Below Grade	0	**Pass**	**Fail**
3.	Addition Conditioned Floor Area	0 ft²					
4.	Addition Unconditioned Floor Area	0 ft²					

7. Opaque Surfaces & Orientation	**8. Total Gross Surface Area**	**9. Total Fenestration Area**	**10. Window to Wall Ratio**	**Pass**	**Fail**
North Wall	6,386 ft²	2,108 ft²	33.0%	☐	☐
East Wall	4,257 ft²	1,405 ft²	33.0%	☐	☐
South Wall	6,386 ft²	2,108 ft²	33.0%	☐	☐
West Wall	4,257 ft²	1,425 ft²	33.5%	☐	☐
Total	**21,287 ft²**	**7,047 ft²**	**33.1%**	☐	☐
Roof	5,000 ft²	0 ft²	00.0%	☐	☐

Not useable for compliance

J. FENESTRATION ASSEMBLY SUMMARY — § 110.6 — Confirmed

1. Fenestration Assembly Name / Tag or I.D.	2. Fenestration Type	3. Certification Method[1]	4. Assembly Method	5. Area ft²	6. Overall U-factor	7. Overall SHGC	8. Overall VT	9. Status[2]	Pass	Fail
Base_AllCZ_FixedWindowU36	VerticalFenestration	NFRCRated	Manufactured	4705	0.36	0.25	0.42	N	☐	☐
Base_AllCZ_FixedWindowU36-2	VerticalFenestration	NFRCRated	SiteBuilt	2342	0.36	0.25	0.42	N	☐	☐

[1] Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Site-built fenestration less than 1,000 ft², or more than or equal to 1,000 ft² see Reference Nonresidential Appendix NA6.

[2] Status: N - New, A – Altered, E – Existing

Taking compliance credit for fenestration shading devices? (if "Yes", see NRCC-PRF-ENV-DETAILS for more information)	

K. OPAQUE SURFACE ASSEMBLY SUMMARY — § 120.7/ § 140.3 — Confirmed

1. Surface Name	2. Surface Type	3. Area (ft²)	4. Framing Type	5. Cavity R-Value	6. Continuous R-Value	7. U-Factor / F-Factor / C-Factor	8. Status[1]	Pass	Fail
Base_CZ12-SlabOnOrBelowGrade	UndergroundFloor	17876	NA	0	NA	F-Factor: 0.730	N	☐	☐
Base_CZ12-Exterior Wall	ExteriorWall	21287	Metal	0	14	U-Factor: 0.062	N	☐	☐
NACM_Interior Wall	InteriorWall	16636	Metal	0	NA	U-Factor: 0.319	N	☐	☐
Base_CZ12-Roof-1	Roof	17876	NA	0	25	U-Factor: 0.039	N	☐	☐
NACM_Drop Ceiling	InteriorFloor	53628	NA	0	NA	U-Factor: 0.292	N	☐	☐
NACM_Interior Floor	InteriorFloor	40752	NA	0	NA	U-Factor: 0.238	N	☐	☐
Base_CZ12-Roof-2	Roof	5000	NA	0	25	U-Factor: 0.039	N	☐	☐

[1] Status: N - New, A – Altered, E – Existing

L. ROOFING PRODUCT SUMMARY — § 140.3 — Confirmed

1. Product Type	2. Product ≥25 lb ft²	3. Aged Solar Reflectance	4. Thermal Emittance	5. SRI	6. Cool Roof Credit	7. CRRC Product ID Number	Pass	Fail
Base_CZ12-Roof-1	No	0.63		Not Provided	Yes	CRRC Prod. ID: XXXX-XXXX	☐	☐
Base_CZ12-Roof-2	Yes	0.08		NA	No	NA	☐	☐

Not useable for compliance

M. HVAC SYSTEM SUMMARY (see NRCC-PRF-MCH-DETAILS for more information) | **§ 110.1 / § 110.2**

Dry System Equipment [1] (Fan & Economizer info included below in Table N) — Confirmed

1.	2.	3.	4.	5.	6.	7.	8.	9.		10.	11.	Pass	Fail
Equip Name	Equip Type	System Type (Simple [3] or Complex [4])	Qty	Total Heating Output (kBtu/h)	Supp Heat Source (Y/N)	Supp Heat Output (kBtuh)	Total Cooling Output (kBtu/h)	Efficiency		Acceptance Testing Required? (Y/N) [5]	Status[6]		
								Cooling	Heating				
BottomVAV	PVAV	Complex	1	269	No	0	461	EER-9.8	NA	Yes	N	☐	☐
Mid VAV	PVAV	Complex	1	308	No	0	510	EER-9.8	NA	Yes	N	☐	☐
Top VAV	PVAV	Simple	1	399	No	0	525	EER-9.8	NA	No	N	☐	☐
ZoneSystem 1	PTAC	Simple	1	164	No	0	150	EER-9.3	AFUE-78.0	Yes	N	☐	☐

Wet System Equipment [2] — *Pumps* — Confirmed

12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	Pass	Fail
Equip Name	Equip Type	Qty	Vol (gal)	Rated Capacity (kBtu/h)	Efficiency	Standby Loss	Tank Ext. R Value	Qty	GPM	HP	VSD (Y/N)	Status[6]		
Boiler 1	HotWater	NA	NA	390	Thrml. Eff: 0.80	NA	NA	1	19.0	0.500	No	N	☐	☐
Boiler 2	HotWater	NA	NA	390	Thrml. Eff: 0.80	NA	NA	1	19.0	0.500	No	N	☐	☐
WaterHeater 1	Storage	1	43	34	EF: 0.480	NA	NA	NA	NA	NA	No	N	☐	☐

[1] Dry System Equipment includes furnaces, air handling units, heat pumps, etc.

[2] Wet System Equipment includes boilers, chillers, cooling towers, water heaters, etc.

[3] Simple Systems must complete NRCC-CXR-03-E commissioning design review form

[4] Complex Systems must complete NRCC-CXR-04-E commissioning design review form

[5] A summary of which acceptance tests are applicable is provided in NRCC-PRF-MCH-DETAILS

[6] Status: N - New, A – Altered, E – Existing

Discrepancy between modeled and designed equipment sizing? (if "Yes", see Table F. "Additional Remarks" for an explanation)	Yes

Not useable for compliance

N. ECONOMIZER & FAN SYSTEMS SUMMARY[1] | **§ 140.4** | **Confirmed**

1.	2.	3.					4.					5.	Pass	Fail
Equip Name	Outside Air	Supply Fan					Return Fan					Economizer Type (if present)		
	CFM	CFM	HP	BHP	TSP (inch WC)	Control	CFM	HP	BHP	TSP (inch WC)	Control			
BottomVAV	2681	16342	20.000	NA	4.00	VariableSpeedDrive	15448	5.000	4.057	1.00	VariableSpeedDrive	DifferentialDryBulb	☐	☐
Mid VAV	2681	18079	20.000	NA	4.00	VariableSpeedDrive	NA	NA	NA	NA	NA	DifferentialDryBulb	☐	☐
Top VAV	2681	18611	20.000	NA	4.00	VariableSpeedDrive	NA	NA	NA	NA	NA	DifferentialDryBulb	☐	☐
ZoneSystem 1	750	5000	3.000	2.101	1.33	ConstantVolume	NA	NA	NA	NA	NA	NA	☐	☐

[1] *Mechanical ventilation calculations and exhaust fans are included in the NRCC-PRF-MCH-DETAILS section*

O. EQUIPMENT CONTROLS | **§ 120.2** | **Confirmed**

1.	2.	3.	Pass	Fail
Equip Name	Equip Type	Controls		
BottomVAV	PVAV	No DCV Controls, DDC Controls and Dual Maximum Reheat Controls Differential Drybulb Economizer Warmest Zone Supply Air Temp. Reset	☐	☐
Mid VAV	PVAV	1 Zones With CO2Sensor Vent. Control, DDC Controls and Dual Maximum Reheat Controls Differential Drybulb Economizer Warmest Zone Supply Air Temp. Reset	☐	☐
Top VAV	PVAV	No DCV Controls, DDC Controls and Dual Maximum Reheat Controls Differential Drybulb Economizer Warmest Zone Supply Air Temp. Reset	☐	☐
HotWater Loop	Heating Hot Water, Primary Only	Outside Air Reset Temperature Control, DDC	☐	☐
SHWSys1	Service Hot Water, Primary Only	Fixed Temperature Control, No DDC	☐	☐

Not useable for compliance

P. SYSTEM DISTRIBUTION SUMMARY — **§ 120.4/ § 140.4(i)**

		Dry System Distribution			Confirmed	
1.	**2.**	**3.**	**4.**			
Equip Name	**Equip Type**	**Duct Leakage (HERS)**	**Ducts**		**Pass**	**Fail**
			Insulation R-Value	**Location (conditioned or unconditioned)**		
BottomVAV	PVAV	Yes	12	Conditioned	☐	☐

Does the Project Include Zonal Systems? (if "Yes", see NRCC-PRF-MCH-DETAILS for system information)	Yes
Does the Project Include a Solar Hot Water System? (if "Yes", see NRCC-PRF-MCH-DETAILS for system information)	Yes
Multifamily or Hotel/ Motel Occupancy? (if "Yes", see NRCC-PRF-MCH-DETAILS for DHW system information)	No

Q. INDOOR CONDITIONED LIGHTING GENERAL INFO (see NRCC-PRF-LTI-DETAILS for more info) — **§ 140.6**

						Confirmed	
1.	**2.**	**3.**	**4.**	**5.**			
Occupancy Type [1]	**Conditioned Floor Area [2] (ft^2)**	**Installed Lighting Power (Watts)**	**Lighting Control Credits (Watts)**	**Additional (Custom) Allowance**		**Pass**	**Fail**
				Area Category Footnotes (Watts)	**Tailored Method (Watts)**	☐	☐
Office (Greater than 250 square feet in floor area)	53,631	32,685	439	0	0	☐	☐
Office (250 square feet in floor area or less)	5,000	5,000	0	0	0	☐	☐
Building Totals:	**58,631**	**37,685**	**439**	**0**			

[1] *See Table 140.6-C*

[2] *See NRCC-LTI-01-E for unconditioned spaces*

Not useable for compliance

R. INDOOR CONDITIONED LIGHTING SCHEDULE (Adapted from NRCC-LTI-01-E)[1] **§ 130.0**

Luminaire Schedule (includes all permanent installed lighting in conditioned space, and portable lighting over 0.3 w/ft^2 in offices)		**Installed Watts (Conditioned)**					**Confirmed**	
Name or Item Tag	**Complete Luminaire Description (i.e., 3-lamp fluorescent troffer, F32T8, one dimmable electronic ballast)**	**Watts per luminaire**	**How Wattage is Determined**		**Total Number Luminaires**	**Installed Watts**	**Pass**	**Fail**
			CEC Default from NA8	**According to §130.0(c)**				
Luminaire 1	T8-1	60	Yes	No	30	1,800	☐	☐
Luminaire 1-2	T8-2	70	Yes	No	30	2,100	☐	☐
Luminaire 1-3	T8-3	50	Yes	No	40	2,000	☐	☐
Luminaire 1-4	T8-4	72	No	Yes	40	2,880	☐	☐

[1] *If lighting power densities were used in the compliance model Building Departments will need to check prescriptive forms for Luminaire Schedule details.*

S1. COVERED PROCESS SUMMARY – ENCLOSED PARKING GARAGES **§ 140.9**

This Section Does Not Apply

S2. COVERED PROCESS SUMMARY – COMMERCIAL KITCHENS **§ 140.9**

This Section Does Not Apply

S3. COVERED PROCESS SUMMARY – COMPUTER ROOMS **§ 140.9**

This Section Does Not Apply

S4. COVERED PROCESS SUMMARY – LABORATORY EXHAUSTS **§ 140.9**

This Section Does Not Apply

T. UNMET LOAD HOURS

This Section Does Not Apply

Not useable for compliance

U. ENERGY USE SUMMARY

	Electric (kWh/yr)	Natural Gas (therms/yr)
Total Annual Baseline	497020	5100.88
Total Annual Proposed	485849	4444.35

Not useable for compliance

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT		**§ 10-103**
I certify that this Certificate of Compliance documentation is accurate and complete.		
Documentation Author Name: Author Name	Signature:	
Company: Author Companny		
Address: 200 Acme Street	Signature Date:	
City/State/Zip: Sacramento / CA / 92484	CEA Identification (If applicable): CEA-222	
Phone: 222-222-2222		

RESPONSIBLE PERSON'S DECLARATION STATEMENT	
I certify the following under penalty of perjury, under the laws of the State of California:	
1	I hereby affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code to sign this document as the person responsible for its preparation; and that I am licensed in the State of California as a civil engineer, mechanical engineer, electrical engineer, or I am a licensed architect.
2	I affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code by section 5537.2 or 6737.3 to sign this document as the person responsible for its preparation; and that I am a licensed contractor performing this work.
3	I affirm that I am eligible under Division 3 of the Business and Professions Code to sign this document because it pertains to a structure or type of work described as exempt pursuant to Business and Professions Code Sections 5537, 5538 and 6737.1.

Responsible Envelope Designer Name: Mr. Envelope	Signature:	
Company: Envelope Designer		
Address: 300 Acme street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 1	
Phone: 333-333-3333	Title: Architect	License #: - specify LIC-333
Responsible Lighting Designer Name: Lighting Name	Signature:	
Company: Lighting Company		
Address: 400 Acme Street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 1	
Phone: 444-444-4444	Title: Engineer	License #: LIC-444
Responsible Mechanical Designer Name: MEP Name	Signature:	
Company: Mechanical Company		
Address: 500 Acme Street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 2	
Phone: 555-555-5555	Title: Contractor	License #: LIC-555

Not useable for compliance

NRCC-PRF-ENV-DETAILS -SECTION START-

A. OPAQUE SURFACE ASSEMBLY DETAILS				Confirmed	
1.	2.	3.	4.	Pass	Fail
Surface Name	Surface Type	Description of Assembly Layers	Notes		
Base_CZ12-SlabOnOrBelowGrade	UndergroundFloor		Slab Construction Notes	☐	☐
Base_CZ12-Exterior Wall	ExteriorWall	Stucco - 7/8 in. Compliance Insulation R13.99 Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 1/2 in.	Exterior Wall Notes	☐	☐
NACM_Interior Wall	InteriorWall	Gypsum Board - 5/8 in. Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 5/8 in.	Interior Wall Notes	☐	☐
Base_CZ12-Roof-1	Roof	Metal Standing Seam - 1/16 in. Compliance Insulation R24.86	Roof Notes	☐	☐
NACM_Drop Ceiling	InteriorFloor	Acoustic Tile - 3/4 in.	Interior Ceiling Notes	☐	☐
NACM_Interior Floor	InteriorFloor	Metal Deck - 1/16 in. Concrete - 140 lb/ft3 - 4 in. Carpet - 3/4 in.	Interior Floor Notes	☐	☐
Base_CZ12-Roof-2	Roof	Metal Standing Seam - 1/16 in. Compliance Insulation R24.86	Roof Notes 2 Product >=25	☐	☐

B. OVERHANG DETAILS (Adapted from NRCC-ENV-02-E)
This Section Does Not Apply

Not useable for compliance

NRCC-PRF-MCH-DETAILS -SECTION START-

A. MECHANICAL VENTILATION AND REHEAT *(Adapted from 2013-NRCC-MCH-03-E)* — **Confirmed**

	1. DESIGN AIR FLOWS							2. VENTILATION (§ 120.1)								Confirmed	
CONDITIONED ZONE NAME	HEATING / COOLING SYSTEM ID	DESIGN PRIMARY AIR FLOW (CFM)	DESIGN PRIMARY MINIMUM AIR FLOW (CFM)	MINIMUM PRIMARY AIR FLOW FRACTION	MAXIMUM HEATING AIR FLOW (CFM)	MAXIMUM HEATING AIR FLOW FRACTION	DDC CONTROL (Y/N)	VENT SYSTEM ID	CONDITIONED AREA (ft2)	MIN. VENT PER AREA (CFM/ft2)	DESIGN NUM. OF PEOPLE	MIN. VENT PER PERSON (CFM/person)	REQ'D VENT AIR FLOW (CFM)	DESIGN VENT AIR FLOW (CFM)	TRANSFER AIRFLOW (CFM)	DCV (Y/N)	Pass	Fail
Core_bottom Thermal Zone	BottomVAV	8,741	1,748	0.20	4,371	1	Y	BottomVAV	10,587	0.15	106	15.0	1,588	1,588	NA	N	☐	☐
Perimeter_bot_ZN_1 Thermal Zone	BottomVAV	2,508	502	0.20	1,254	1	Y	BottomVAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_bot_ZN_2 Thermal Zone	BottomVAV	1,613	323	0.20	807	1	Y	BottomVAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐
Perimeter_bot_ZN_3 Thermal Zone	BottomVAV	1,760	352	0.20	880	1	Y	BottomVAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_bot_ZN_4 Thermal Zone	BottomVAV	1,719	344	0.20	860	1	Y	BottomVAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐
Core_mid Thermal Zone	Mid VAV	10,587	2,117	0.20	5,293	1	Y	Mid VAV	10,587	0.15	106	15.0	1,588	1,588	NA	Y	☐	☐
Perimeter_mid_ZN_1 Thermal Zone	Mid VAV	3,032	606	0.20	1,516	1	Y	Mid VAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_mid_ZN_2 Thermal Zone	Mid VAV	1,908	382	0.20	954	1	Y	Mid VAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐
Perimeter_mid_ZN_3 Thermal Zone	Mid VAV	1,840	368	0.20	920	1	Y	Mid VAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_mid_ZN_4 Thermal Zone	Mid VAV	2,063	413	0.20	1,032	1	Y	Mid VAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐

Not useable for compliance

A. MECHANICAL VENTILATION AND REHEAT *(Adapted from 2013-NRCC-MCH-03-E)* — **Confirmed**

1. DESIGN AIR FLOWS								2. VENTILATION (§ 120.1)									Confirmed	
CONDITIONED ZONE NAME	**HEATING / COOLING SYSTEM ID**	**DESIGN PRIMARY AIR FLOW (CFM)**	**DESIGN PRIMARY MINIMUM AIR FLOW (CFM)**	**MINIMUM PRIMARY AIR FLOW FRACTION**	**MAXIMUM HEATING AIR FLOW (CFM)**	**MAXIMUM HEATING AIR FLOW FRACTION**	**DDC CONTROL (Y/N)**	**VENT SYSTEM ID**	**CONDITIONED AREA (ft2)**	**MIN. VENT PER AREA (CFM/ft2)**	**DESIGN NUM. OF PEOPLE**	**MIN. VENT PER PERSON (CFM/person)**	**REQ'D VENT AIR FLOW (CFM)**	**DESIGN VENT AIR FLOW (CFM)**	**TRANSFER AIRFLOW (CFM)**	**DCV (Y/N)**	**Pass**	**Fail**
Core_top Thermal Zone	Top VAV	9,407	1,881	0.20	4,704	1	Y	Top VAV	10,587	0.15	106	15.0	1,588	1,588	NA	N	☐	☐
Perimeter_top_ZN_1 Thermal Zone	Top VAV	3,110	622	0.20	1,555	1	Y	Top VAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_top_ZN_2 Thermal Zone	Top VAV	1,904	381	0.20	952	1	Y	Top VAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐
Perimeter_top_ZN_3 Thermal Zone	Top VAV	2,017	403	0.20	1,009	1	Y	Top VAV	2,232	0.15	22	15.0	335	335	NA	N	☐	☐
Perimeter_top_ZN_4 Thermal Zone	Top VAV	2,173	435	0.20	1,087	1	Y	Top VAV	1,413	0.15	14	15.0	212	212	NA	N	☐	☐
TopFloor-2 Thermal Zone	ZoneSystem 1	NA	NA	NA	NA	NA	N	ZoneSystem 1	5,000	0.15	50	15.0	750	750	NA	N	☐	☐
								TOTAL	58,631		584		8,796	8,796	NA		☐	☐

B. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY — **§ 140.4**

1.	2.	3.	4.		5.	6.	7.			8.			Confirmed	
System ID	**System Type**	**Qty**	**Rated Capacity (kBtuh)**		**Economizer**	**Zone Name**	**Airflow (cfm)**			**Fan**			**Pass**	**Fail**
			Heating	**Cooling**			**Design**	**Min.**	**Min. Ratio**	**BHP**	**Cycles**	**ECM Motor**		
ZoneSystem 1	PTAC	1	164.00	150.00	No	TopFloor-2 Thermal Zone	5000	NA	NA	2.1	☐	☐	☐	☐
CoreBottomZn TU	VAVReheatBox	1	81.00	NA	NA	Core_bottom Thermal Zone	8741	1748	0.20	NA	NA	☐	☐	☐

Not usable for compliance

B. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY — **§ 140.4**

1.	2.	3.	4.		5.	6.	7.			8.			Confirmed	
System ID	System Type	Qty	Rated Capacity (kBtuh)		Economizer	Zone Name	Airflow (cfm)			Fan			Pass	Fail
			Heating	Cooling			Design	Min.	Min. Ratio	BHP	Cycles	ECM Motor		
PerimeterBottomZn1 TU	VAVReheatBox	1	45.00	NA	NA	Perimeter_bot_ZN_1 Thermal Zone	2508	502	0.20	NA	NA	☐	☐	☐
PerimeterBottomZn2 TU	VAVReheatBox	1	30.00	NA	NA	Perimeter_bot_ZN_2 Thermal Zone	1613	323	0.20	NA	NA	☐	☐	☐
PerimeterBottomZn3 TU	VAVReheatBox	1	37.00	NA	NA	Perimeter_bot_ZN_3 Thermal Zone	1760	352	0.20	NA	NA	☐	☐	☐
PerimeterBottomZn4 TU	VAVReheatBox	1	31.00	NA	NA	Perimeter_bot_ZN_4 Thermal Zone	1719	344	0.20	NA	NA	☐	☐	☐
CoreMidZn TU	VAVReheatBox	1	108.00	NA	NA	Core_mid Thermal Zone	10587	2117	0.20	NA	NA	☐	☐	☐
PerimeterMidZn1 TU	VAVReheatBox	1	53.00	NA	NA	Perimeter_mid_ZN_1 Thermal Zone	3032	606	0.20	NA	NA	☐	☐	☐
PerimeterMidZn2 TU	VAVReheatBox	1	34.00	NA	NA	Perimeter_mid_ZN_2 Thermal Zone	1908	382	0.20	NA	NA	☐	☐	☐
PerimeterMidZn3 TU	VAVReheatBox	1	40.00	NA	NA	Perimeter_mid_ZN_3 Thermal Zone	1840	368	0.20	NA	NA	☐	☐	☐
PerimeterMidZn4 TU	VAVReheatBox	1	35.00	NA	NA	Perimeter_mid_ZN_4 Thermal Zone	2063	413	0.20	NA	NA	☐	☐	☐
Core Top Zn TU	VAVReheatBox	1	176.00	NA	NA	Core_top Thermal Zone	9407	1881	0.20	NA	NA	☐	☐	☐
PerimeterTopZn1 TU	VAVReheatBox	1	60.00	NA	NA	Perimeter_top_ZN_1 Thermal Zone	3110	622	0.20	NA	NA	☐	☐	☐
PerimeterTopZn2 TU	VAVReheatBox	1	38.00	NA	NA	Perimeter_top_ZN_2 Thermal Zone	1904	381	0.20	NA	NA	☐	☐	☐
PerimeterTopZn3 TU	VAVReheatBox	1	49.00	NA	NA	Perimeter_top_ZN_3 Thermal Zone	2017	403	0.20	NA	NA	☐	☐	☐
PerimeterTopZn4 TU	VAVReheatBox	1	41.00	NA	NA	Perimeter_top_ZN_4 Thermal Zone	2173	435	0.20	NA	NA	☐	☐	☐

Not useable for compliance

C. EXHAUST FAN SUMMARY

This Section Does Not Apply

D. DHW EQUIPMENT SUMMARY – *(Adapted from NRCC-PLB-01)*

§ 110.3 | Confirmed

1. DHW Name	2. Fuel	3. Type	4. Qty	5. Distribution Type	6. Rated Input kBtuh	7. Efficiency	8. Pilot Energy (Btu/h)	9. External Tank Insulation	10. Vol	11. Standby Loss	12. Vol. of Suppl. Storage Tank	Pass	Fail
WaterHeater 1	NaturalGas	Storage	1	Nonrecirculating	34	EF: 0.480	0	NA	43	NA	NA	☐	☐

E. MULTI-FAMILY CENTRAL DHW SYSTEM DETAILS

This Section Does Not Apply

F. SOLAR HOT WATER HEATING SUMMARY (Adapted from NRCC-STH-01)

G. § RA4

1.	2. Collector											
System Name	Manufacturer	Brand	Model #	SRRC Cert	Type	Area ft^2	Rated Eff.Curve Slope	Rated Eff.Curve Intercept	Number	Fluid	Angle from true north (degrees)	Slope from horizontal (degrees)
SHWSys1	American Standard	Acme	PNL-123	SRCC-1234	Flat	1000	2	3		Water	0	30

F. SOLAR HOT WATER HEATING SUMMARY (Adapted from NRCC-STH-01)

G. § RA4

1.	3. Software		4. Storage		5.	6	Confirmed	
System Name	Name of program used	Version	Water Heater Tank Volume (gallons)	Secondary Tank Volume (gallons)	# of Identical Dwelling Units	Solar Fraction	Pass	Fail
SHWSys1	F-Chart	2.1.2	43	30	0	0.2	☐	☐

Not useable for compliance

G. MECHANICAL HVAC ACCEPTANCE TESTS & FORMS *(Adapted from 2013-NRCC-MCH-01-E)* **§ RA4**

Declaration of Required Acceptance Certificates (NRCA) – Acceptance Certificates that may be submitted. (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify).

Test Description		MCH-02A	MCH-03A	MCH-04A	MCH-05A	MCH-06A	MCH-07A	MCH-08A	MCH-09A	MCH-10A	MCH-11A	MCH-12A	MCH-13A	MCH-14A	MCH-15A	MCH-16A	MCH-17A	MCH-18A	Confirmed	
Equipment Requiring Testing or Verification	# of units	Outdoor Air	Single Zone Unitary	Air Dist. Ducts	Economizer Controls	DCV	Supply Fan VAV	Valve leakage	Supply Water Temp. Reset	Hyd. Variable Flow Control	Auto Demand Shed Control	FDD for DX Units	Auto FDD for Air & Zone	Dist. Energy Storage DX AC	TES Systems	Supply Air Temp. Reset	Condenser Water Reset Controls	ECMS	Pass	Fail
HotWater Loop	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
SHWSys1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
BottomVAV	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
Mid VAV	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
Top VAV	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐
ZoneSystem 1	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	☐	☐

Not usable for compliance

NRCC-PRF-LTI-DETAILS -SECTION START-

A. INDOOR CONDITIONED LIGHTING CONTROL CREDITS (Adapted from NRCC-LTI-02-E) **§ 140.6**

Lighting Control Credits Schedule (includes all lighting controls installed in conditioned space for compliance credit per §140.6(a)2 and Table 140.6-A)				Control Credit Calculation			√ If Acceptance Test Required	Confirmed	
Location in Building	Occupancy Type (must meet requirements of Table 140.6-A)	Type/Description of Lighting Control (i.e., partial on occupancy sensor, manual dimming, etc.)	# of Units	Watts of Controlled Lighting	Power Adjustment Factor	Control Credit Watts		Pass	Fail
Core_bottom	Office (Greater than 250 square feet in floor area)	DemandResponsiveControl	2	3900	0.05	195	X	☐	☐

A. INDOOR CONDITIONED LIGHTING CONTROL CREDITS (Adapted from NRCC-LTI-02-E) — **§ 140.6**

Lighting Control Credits Schedule (includes all lighting controls installed in conditioned space for compliance credit per §140.6(a)2 and Table 140.6-A)				**Control Credit Calculation**			**√ If Acceptance Test Required**	**Confirmed**	
Location in Building	Occupancy Type (must meet requirements of Table 140.6-A)	Type/Description of Lighting Control (i.e., partial on occupancy sensor, manual dimming, etc.)	# of Units	Watts of Controlled Lighting	Power Adjustment Factor	Control Credit Watts		**Pass**	**Fail**
Core_mid	Office (Greater than 250 square feet in floor area)	DemandResponsiveControl	6	4880	0.05	244	X	☐	☐

B. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROLS (Adapted from NRCC-LTI-02-E) — **§ 130.1**

Lighting Control Credits Schedule (includes all lighting controls installed in conditioned space to meet mandatory requirements per §130.1)			**Standards Compliance** (√ all that apply or "E" if exempt)					**√ If Acceptance Test Required**	**Confirmed**	
Location in Building	Type/Description of Lighting Control (i.e., occupancy sensor, dimming, automatic daylighting control, etc.)	# of Units	§130.1(a)	§130.1(b)	§130.1(c)	§130.1(d)	§130.1(e)		**Pass**	**Fail**
Core_bottom	Lighting Control 1	2	X	X	NA	X	X	NA	☐	☐
Core_bottom	Lighting Control 2	4	X	X	X	X	X	NA	☐	☐
Core_mid	Lighting Control 3	4	X	X	X	X	X	NA	☐	☐

§130.1(a) = Manual area controls; §130.0(b) = Multi Level; §130.1(c) = Auto Shut-Off; §130.1(d) = Mandatory Daylight; §130.1(e) = Demand Responsive

C. TAILORED METHOD LIGHTING POWER ALLOWANCE SUMMARY AND CHECKLIST (Adapted from NRCC-LTI-04-E) — **§ 140.6**

General lighting power (see Table D)	0
General lighting power from special function areas (see Table E)	NA
Additional "use it or lose it" (See Table G)	0
Total watts	0

D. GENERAL LIGHTING POWER (Adapted from NRCC-LTI-04-E) — **§ 140.6-D**

This Section Does Not Apply

E. GENERAL LIGHTING FROM SPECIAL FUNCTION AREAS (Adapted from NRCC-LTI-04-E) — **§ 140.6(c) 3H**

Room Number	Primary Function Area	Illuminance Value (LUX)	Room Cavity Ratio (Table G)	Allowed LPD	Floor Area (ft^2)	**Allowed Watts**	**Confirmed**	
							Pass	**Fail**
NA	NA	NA	NA	NA	NA	NA	☐	☐

Not useable for compliance

Note: Tailored Method for Special Function Areas is not currently implemented

F. ROOM CAVITY RATIO (Adapted from NRCC-LTI-04-E)

Rectangular Spaces

Room Number	Task/Activity Description	Room Length (ft)	Room Width (ft)	Room Cavity Height (ft)	RCR	Confirmed	
						Pass	Fail
NA	NA	NA	NA	NA	NA	☐	☐

Non-Rectangular Spaces

This Section Does Not Apply

Note: All applicable spaces are listed under the Non-Rectangular Spaces table

G. ADDITIONAL "USE IT OR LOSE IT" (Adapted from NRCC-LTI-04-E)

1.	2.	3.	4.	Allowed Watts	Confirmed	
Wall Display	Combined Floor Display and Task Lighting	Combined Ornamental and Special Effects Lighting	Very Valuable Merchandise		Pass	Fail
0	0	0	0	**0**	☐	☐

5. Wall Display

This Section Does Not Apply

6. Floor Display and Task Lighting

This Section Does Not Apply

7. Combined Ornamental and Special Effects Lighting

This Section Does Not Apply

8. Very Valuable Merchandise

This Section Does Not Apply

Not useable for compliance

H. INDOOR & OUTDOOR LIGHTING ACCEPTANCE TESTS & FORMS (Adapted from NRCC-LTI-01-E and NRCC-LTO-01-E) **§ 130.4**

Declaration of Required Acceptance Certificates (NRCA) –Acceptance Certificates that must be verified in the field. (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify).

Test Description		Indoor			Outdoor	Confirmed	
		NRCA-LTI-02-A	NRCA-LTI-03-A	NRCA-LTI-04-A	NRCA-LTO-02-A	Pass	Fail
Equipment Requiring Testing or Verification	# of units	Occ Sensors / Auto Time Switch	Auto Daylight	Demand Responsive	Outdoor Controls		
Occupant Sensors		☒	☐	☐	☐	☐	☐
Automatic Time Switch		☒	☐	☐	☐	☐	☐
Automatic Daylighting		☐	☒	☐	☐	☐	☐
Demand Responsive		☐	☐	☒	☐	☐	☐
Outdoor Controls		☐	☐	☐	☒	☐	☐

Not useable for compliance

SAMPLE COMPLIANCE DOCUMENTATION
EXAMPLE BUILDING B

Project Name:	General_Section - NewEnvelope	NRCC-PRF-01-E	Page 1 of 15
Project Address:	120 Acme Street Sacramento 95814	Calculation Date/Time:	17:45, Thu, Jun 25, 2015
Compliance Scope:	NewEnvelope	Input File Name:	GS_v3c_sml_NewEnvelope.cibd

A. PROJECT GENERAL INFORMATION

1.	Project Location (city)	Sacramento	**7.**	# of dwelling units	0
2.	CA Zip Code	95814	**8.**	Compliance Software (version)	CBECC-Com 2013-3c (759)
3.	Climate Zone	12	**9.**	Building Orientation (deg)	(N) 0 deg
4.	Total Conditioned Floor Area	22,876 ft^2	**10.**	Permitted Scope of Work	NewEnvelope
5.	Total Unconditioned Floor Area	1,000 ft^2	**11.**	Building Type(s)	Nonresidential
6.	# of Stories (Habitable Above Grade)	3			

B. COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS **§ 140.1**

BUILDING DOES NOT COMPLY

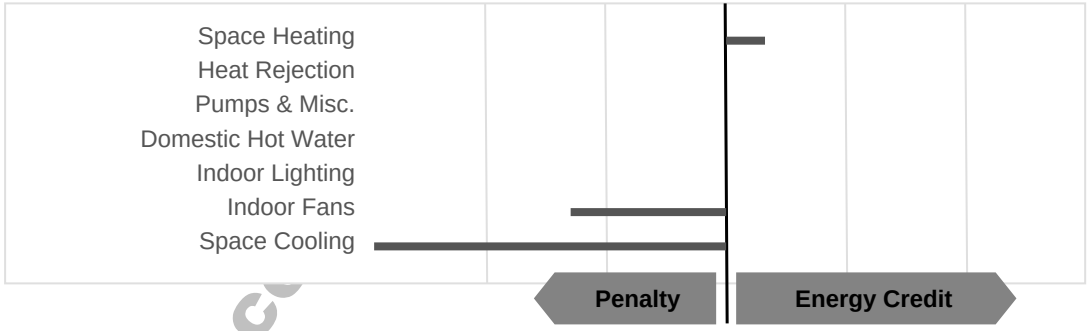
1. Energy Component	2. Standard Design (TDV)	3. Proposed Design (TDV)	4. Compliance Margin (TDV)	5. Percent Better than Standard
Space Heating	9.8	9.2	0.6	6.1%
Space Cooling	81.0	86.7	-5.7	-7.0%
Indoor Fans	20.6	23.1	-2.5	-12.1%
Heat Rejection	--	--	--	--
Pumps & Misc.	0.5	0.5	--	0.0%
Domestic Hot Water	--	--	--	--
Indoor Lighting	59.3	59.3	--	0.0%
COMPLIANCE TOTAL	**171.2**	**178.8**	**-7.6**	**-4.4%**
Receptacle	127.0	127.0		0.0%
Process	--	--		--
Process Ltg	--	--		--
TOTAL	**298.2**	**305.8**		**-2.5%**

Not useable for compliance

C. PRIORITY PLAN CHECK/ INSPECTION ITEMS (in order of highest to lowest TDV energy savings)

1st	Space Heating: Check envelope and mechanical
2nd	Heat Rejection: Check envelope and mechanical
3rd	Pumps & Misc.: Check mechanical
4th	Domestic Hot Water: Check mechanical
5th	Indoor Lighting: Check lighting
6th	Indoor Fans: Check envelope and mechanical
7th	Space Cooling: Check envelope and mechanical

Compliance Margin By Energy Component (from Table B column 4)



D. EXCEPTIONAL CONDITIONS

The project shows partial compliance, using envelope-only compliance. The building must show either lighting and mechanical partial compliance or full new building compliance before operation.

The project shows partial compliance, either envelope only or mechanical only, excluding lighting systems. The building must show partial compliance including lighting or full new building compliance or show prescriptive lighting compliance before operation

The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.

The proposed building includes spaces without cooling equipment, but cooling equipment has been added to the model, presumably to meet unmet load hour requirements. Verify that the performance parameters of the added equipment are minimally compliant.

The compliance model includes HVAC equipment with capacities that differ from the building plans, presumably to meet unmet load hour requirements. Verify that the equipment in the design provides adequate cooling and heating capacity for the spaces served.

Significant modeling approximations have been used to represent the building design. Such approximations are common and an expected part of energy modeling. However, such approximations should have thermodynamically similar results in the model and in the completed building. Ensure that a narrative has been provided. Review the narrative and ensure the modeling approximations are appropriate. Some approximations may not be appropriate. In such cases, the Exceptional Design Compliance procedure should be used. An example would be modeling of thermal storage by modifying the efficiency of heating and cooling equipment

E. HERS VERIFICATION

This Section Does Not Apply

F. ADDITIONAL REMARKS

Narrative for Office Medium Simplified Geometry

Not useable for compliance

F. ADDITIONAL REMARKS

trqrerwqy6tryuqwgtr uywgrrywuierywe iuhytuieiutye terio erteriterituree o
e8urtyetyeirutyeritr ioetrertioetuioerute toi etueoitueoit eoiitjertoeotju

Not useable for compliance

G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

Identify which building components use the performance or prescriptive path for compliance. "NA"= not in project

For components that utilize the performance path, indicate the sheet number that includes mandatory notes on plans.

Building Component	Compliance Path		Compliance Forms *(required for submittal)*	Location of Mandatory Notes on Plans
Envelope	☐	Performance	NRCC-PRF-ENV-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-ENV-01 / 02 / 03 / 04 / 05 / 06-E	
	☐	NA		
Mechanical	☐	Performance	NRCC-PRF-MCH-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-MCH-01 / 02 / 03 / 04 / 05 / 06 / 07-E	
	☐	NA		
Domestic Hot Water	☐	Performance	NRCC-PRF-PLB-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-PLB-01-E	
	☐	NA		
Lighting (Indoor Conditioned)	☐	Performance	NRCC-PRF-LTI-DETAILS (section of the NRCC-PRF-01-E)	
	☒	Prescriptive	NRCC-LTI-01 / 02 / 03 / 04 / 05-E	
	☐	NA		
Covered Process: Commercial Kitchens	☐	Performace	S2 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 03-E	
	☐	NA		
Covered Process: Computer Rooms	☒	Performance	S3 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 04-E	
	☐	NA		
Covered Process: Laboratory Exhaust	☒	Performace	S4 (section of the NRCC-PRF-01-E)	
	☐	Prescriptive	NRCC-PRC-01/ 09-E	
	☐	NA		

Not useable for compliance

G. COMPLIANCE PATH & CERTIFICATE OF COMPLIANCE SUMMARY

The following building components are only eligible for prescriptive compliance. Indicate which are relevant to the project.

Yes	NA	Prescriptive Requirement	Compliance Forms
☒	☐	Lighting (Indoor Unconditioned) §140.6	NRCC-LTI-01 / 02 / 03 / 04 / 05-E
☐	☐	Lighting (Outdoor) §140.7	NRCC-LTO-01 / 02 / 03-E
☒	☐	Lighting (Sign) §140.8	NRCC-LTS-01-E
☐	☐	Solar Thermal Water Heating: §140.5	NRCC-STH-01-E

The following building components may have mandatory requirements per Part 6. Indicate which are relevant to the project.

Yes	NA	Mandatory Requirement	Compliance Forms
		Commissioning: §120.8	
☐	☒	Simple Systems	NRCC-CXR-01 / 02 / 03 / 05-E
☒	☐	Complex Systems	NRCC-CXR-01 / 02 / 04 / 05-E
☒	☐	Electrical: §130.5	NRCC-ELC-01-E
☐	☐	Solar Ready: §110.10	NRCC-SRA-01 / 02-E
		Covered Process: §120.6	NRCC-PRC-01-E
☒	☐	Parking Garage	NRCC-PRC-02-E
☐	☐	Commercial Refrigeration	NRCC-PRC-05-E
☐	☐	Warehouse Refrigeration	NRCC-PRC-06/07/08-E
☒	☐	Compressed Air	NRCC-PRC-10-E
☒	☐	Process Boilers	NRCC-PRC-11-E

Not useable for compliance

H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.		**Confirmed**	
Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Envelope	☒ NRCI-ENV-01-E - For all buildings	☐	☐
	☒ NRCA-ENV-02-F- NFRC label verification for fenestration	☐	☐
Mechanical	☒ NRCI-MCH-01-E - For all buildings with Mechanical Systems	☐	☐
	☒ NRCA-MCH-02-A- Outdoor Air	☐	☐
	☒ NRCA-MCH-03-A – Constant Volume Single Zone HVAC	☐	☐
	☒ NRCA-MCH-04-H- Air Distribution Duct Leakage	☐	☐
	☒ NRCA-MCH-05-A- Air Economizer Controls	☐	☐
	☒ NRCA-MCH-06-A- Demand Control Ventilation	☐	☐
	☒ NRCA-MCH-07-A – Supply Fan Variable Flow Controls	☐	☐
	☒ NRCA-MCH-08-A- Valve Leakage Test	☐	☐
	☒ NRCA-MCH-09-A – Supply Water Temp Reset Controls	☐	☐
	☒ NRCA-MCH-10-A- Hydronic System Variable Flow Controls	☐	☐
	☒ NRCA-MCH-11-A – Auto Demand Shed Controls	☐	☐
	☒ NRCA-MCH-12-A- Packaged Direct Expansion Units	☐	☐
	☒ NRCA-MCH-13-A- Air Handling Units and Zone Terminal Units	☐	☐
	☒ NRCA-MCH-14-A- Distributed Energy Storage	☐	☐
	☒ NRCA-MCH-15-A – Thermal Energy Storage	☐	☐
	☒ NRCA-MCH-16-A- Supply Air Temp Reset Controls	☐	☐
	☒ NRCA-MCH-17-A – Condensate Water Temp Reset Controls	☐	☐
	☒ NRCA-MCH-18-A- Energy Management Controls Systems	☐	☐
	☒ NRCV-MCH-04-H- Duct Leakage Test	☐	☐

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Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Plumbing	☒ NRCI-PLB-01-E - For all buildings with Plumbing Systems	☐	☐
	☒ NRCI-PLB-02-E - required on central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-03-E - Single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-21-E - HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-PLB-22-E - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCV-PLB-21-H- HERS verified central systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCV-PLB-22-H - HERS verified single dwelling unit systems in high-rise residential, hotel/motel application.	☐	☐
	☒ NRCI-STH-01-E - Any solar water heating	☐	☐
Indoor Lighting	☒ NRCI-LTI-01-E - For all buildings	☐	☐
	☒ NRCI-LTI-02-E - Lighting control system, or for an Energy Management Control System (EMCS)	☐	☐
	☒ NRCI-LTI-03-E - Line-voltage track lighting integral current limiter, or for a supplementary overcurrent protection panel used to energize only line-voltage track lighting	☐	☐
	☒ NRCI-LTI-04-E - Two interlocked systems serving an auditorium, a convention center, a conference room, or a theater	☐	☐
	☒ NRCI-LTI-05-E - Lighting Control Credit Power Adjustment Factor (PAF)	☐	☐
	☒ NRCI-LTI-06-E - Additional wattage installed in a video conferencing studio	☐	☐
	☒ NRCA-LTI-02-A - Occupancy sensors and automatic time switch controls.	☐	☐
	☒ NRCA-LTI-03-A - Automatic daylighting controls	☐	☐
	☒ NRCA-LTI-04-A - Demand responsive lighting controls	☐	☐
Outdoor Lighting	☐ NRCI-LTO-01-E – Outdoor Lighting	☐	☐
	☐ NRCI-LTO-02-E- EMCS Lighting Control System	☐	☐
	☒ NRCA-LTO-02-A - Outdoor Lighting Control	☐	☐
Sign Lighting	☐ NRCI-LTS-01-E – Sign Lighting	☐	☐
Electrical	☒ NRCI-ELC-01-E - Electrical Power Distribution	☐	☐
Photovoltaic	☒ NRCI-SPV-01-E Photovoltaic Systems	☐	☐

Not useable for compliance

H. CERTIFICATE OF INSTALLATION, CERTIFICATE OF ACCEPTANCE & CERTIFICATE OF VERIFICATION SUMMARY (NRCI/NRCA/NRCV) – Documentation Author to indicate which Certificates must be submitted for the features to be recognized for compliance (Retain copies and verify forms are completed and signed to post in field for Field Inspector to verify). See Tables G. and H. in MCH and LTI Details Sections for Acceptance Tests and forms by equipment.		**Confirmed**	
Building Component	**Compliance Forms *(required for submittal)***	**Pass**	**Fail**
Covered Process	☒ NRCI-PRC-01-E Refrigerated Warehouse	☐	☐
	☒ NRCA-PRC-01-F- Compressed Air Systems	☐	☐
	☒ NRCA-PRC-02-F- Kitchen Exhaust	☐	☐
	☒ NRCA-PRC-03-F- Garage Exhaust	☐	☐
	☒ NRCA-PRC-04-F- Refrigerated Warehouse- Evaporator Fan Motor Controls	☐	☐
	☒ NRCA-PRC-05-F- Refrigerated Warehouse- Evaporative Condenser Controls	☐	☐
	☒ NRCA-PRC-06-F- Refrigerated Warehouse- Air Cooled Condenser Controls	☐	☐
	☒ NRCA-PRC-07F- Refrigerated Warehouse- Variable Speed Compressor	☐	☐
	☒ NRCA-PRC-08-F- Electrical Resistance Underslab Heating System	☐	☐

I. ENVELOPE GENERAL INFORMATION (See NRCC-PRF-ENV-DETAILS for more information)

						Confirmed	
1.	Total Conditioned Floor Area	22,876 ft^2	**5.**	Number of Floors Above Grade	3		
2.	Total Unconditioned Floor Area	1,000 ft^2	**6.**	Number of Floors Below Grade	0	**Pass**	**Fail**
3.	Addition Conditioned Floor Area	0 ft^2					
4.	Addition Unconditioned Floor Area	0 ft^2					

7. Opaque Surfaces & Orientation	**8. Total Gross Surface Area**	**9. Total Fenestration Area**	**10. Window to Wall Ratio**	**Pass**	**Fail**
North Wall	2,000 ft^2	500 ft^2	25.0%	☐	☐
East Wall	1,500 ft^2	500 ft^2	33.3%	☐	☐
South Wall	2,000 ft^2	500 ft^2	25.0%	☐	☐
West Wall	1,500 ft^2	500 ft^2	33.3%	☐	☐
Total	**7,000 ft^2**	**2,000 ft^2**	**28.6%**	☐	☐
Roof	5,000 ft^2	0 ft^2	00.0%	☐	☐

Not useable for compliance

J. FENESTRATION ASSEMBLY SUMMARY — § 110.6 — Confirmed

1. Fenestration Assembly Name / Tag or I.D.	2. Fenestration Type	3. Certification Method[1]	4. Assembly Method	5. Area ft²	6. Overall U-factor	7. Overall SHGC	8. Overall VT	9. Status[2]	Pass	Fail
Base_AllCZ_FixedWindowU36	VerticalFenestration	NFRCRated	Manufactured	3000	0.36	0.25	0.42	N	☐	☐

[1] Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Site-built fenestration less than 1,000 ft², or more than or equal to 1,000 ft² see Reference Nonresidential Appendix NA6.

[2] Status: N - New, A – Altered, E – Existing

Taking compliance credit for fenestration shading devices? (if "Yes", see NRCC-PRF-ENV-DETAILS for more information)	

K. OPAQUE SURFACE ASSEMBLY SUMMARY — § 120.7/ § 140.3 — Confirmed

1. Surface Name	2. Surface Type	3. Area (ft²)	4. Framing Type	5. Cavity R-Value	6. Continuous R-Value	7. U-Factor / F-Factor / C-Factor	8. Status[1]	Pass	Fail
Base_CZ12-SlabOnOrBelowGrade	UndergroundFloor	17876	NA	0	NA	F-Factor: 0.730	N	☐	☐
Base_CZ12-Exterior Wall	ExteriorWall	9000	Metal	0	14	U-Factor: 0.062	N	☐	☐
NACM_Interior Wall	InteriorWall	8200	Metal	0	NA	U-Factor: 0.319	N	☐	☐
NACM_Drop Ceiling	InteriorFloor	17876	NA	0	NA	U-Factor: 0.292	N	☐	☐
NACM_Interior Floor	InteriorFloor	10000	NA	0	NA	U-Factor: 0.238	N	☐	☐
Base_CZ12-Roof-2	Roof	10000	NA	0	25	U-Factor: 0.039	N	☐	☐

[1] Status: N - New, A – Altered, E – Existing

L. ROOFING PRODUCT SUMMARY — § 140.3 — Confirmed

1. Product Type	2. Product ≥25 lb ft²	3. Aged Solar Reflectance	4. Thermal Emittance	5. SRI	6. Cool Roof Credit	7. CRRC Product ID Number	Pass	Fail
Base_CZ12-Roof-2	Yes	0.08		NA	No	NA	☐	☐

M. HVAC SYSTEM SUMMARY (see NRCC-PRF-MCH-DETAILS for more information)

This Section Does Not Apply

Not useable for compliance

N. ECONOMIZER & FAN SYSTEMS SUMMARY[1]	**§ 140.4**
This Section Does Not Apply	

[1] *Mechanical ventilation calculations and exhaust fans are included in the NRCC-PRF-MCH-DETAILS section*

O. EQUIPMENT CONTROLS	**§ 120.2**
This Section Does Not Apply	

P. SYSTEM DISTRIBUTION SUMMARY	**§ 120.4/ § 140.4(i)**
This Section Does Not Apply	

Multifamily or Hotel/ Motel Occupancy? (if "Yes", see NRCC-PRF-MCH-DETAILS for DHW system information)	No

Q. INDOOR CONDITIONED LIGHTING GENERAL INFO (see NRCC-PRF-LTI-DETAILS for more info)
This Section Does Not Apply

R. INDOOR CONDITIONED LIGHTING SCHEDULE (Adapted from NRCC-LTI-01-E)[1]	**§ 130.0**
This Section Does Not Apply	

[1] *If lighting power densities were used in the compliance model Building Departments will need to check prescriptive forms for Luminaire Schedule details.*

S1. COVERED PROCESS SUMMARY – ENCLOSED PARKING GARAGES	**§ 140.9**
This Section Does Not Apply	

S2. COVERED PROCESS SUMMARY – COMMERCIAL KITCHENS	**§ 140.9**
This Section Does Not Apply	

S3. COVERED PROCESS SUMMARY – COMPUTER ROOMS	**§ 140.9**
This Section Does Not Apply	

S4. COVERED PROCESS SUMMARY – LABORATORY EXHAUSTS	**§ 140.9**
This Section Does Not Apply	

Not useable for compliance

T. UNMET LOAD HOURS

This Section Does Not Apply

U. ENERGY USE SUMMARY

	Electric (kWh/yr)	Natural Gas (therms/yr)
Total Annual Baseline	206559	1172.16
Total Annual Proposed	211393	1093.69

Not useable for compliance

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT		**§ 10-103**
I certify that this Certificate of Compliance documentation is accurate and complete.		
Documentation Author Name: Author Name	Signature:	
Company: Author Companny		
Address: 200 Acme Street	Signature Date:	
City/State/Zip: Sacramento / CA / 92484	CEA Identification (If applicable): CEA-222	
Phone: 222-222-2222		

RESPONSIBLE PERSON'S DECLARATION STATEMENT	
I certify the following under penalty of perjury, under the laws of the State of California:	
1	I hereby affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code to sign this document as the person responsible for its preparation; and that I am licensed in the State of California as a civil engineer, mechanical engineer, electrical engineer, or I am a licensed architect.
2	I affirm that I am eligible under the provisions of Division 3 of the Business and Professions Code by section 5537.2 or 6737.3 to sign this document as the person responsible for its preparation; and that I am a licensed contractor performing this work.
3	I affirm that I am eligible under Division 3 of the Business and Professions Code to sign this document because it pertains to a structure or type of work described as exempt pursuant to Business and Professions Code Sections 5537, 5538 and 6737.1.

Responsible Envelope Designer Name: Mr. Envelope	Signature:	
Company: Envelope Designer		
Address: 300 Acme street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 1	
Phone: 333-333-3333	Title: Architect	License #: - specify LIC-333
Responsible Lighting Designer Name: Lighting Name	Signature:	
Company: Lighting Company		
Address: 400 Acme Street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 1	
Phone: 444-444-4444	Title: Engineer	License #: LIC-444
Responsible Mechanical Designer Name: MEP Name	Signature:	
Company: Mechanical Company		
Address: 500 Acme Street	Date Signed:	
City/State/Zip: Sacramento / CA / 92484	Declaration Statement Type: 2	
Phone: 555-555-5555	Title: Contractor	License #: LIC-555

Not useable for compliance

NRCC-PRF-ENV-DETAILS -SECTION START-

A. OPAQUE SURFACE ASSEMBLY DETAILS				Confirmed	
1.	2.	3.	4.	Pass	Fail
Surface Name	**Surface Type**	**Description of Assembly Layers**	**Notes**		
Base_CZ12-SlabOnOrBelowGrade	UndergroundFloor		Slab Construction Notes	☐	☐
Base_CZ12-Exterior Wall	ExteriorWall	Stucco - 7/8 in. Compliance Insulation R13.99 Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 1/2 in.	Exterior Wall Notes	☐	☐
NACM_Interior Wall	InteriorWall	Gypsum Board - 5/8 in. Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 5/8 in.	Interior Wall Notes	☐	☐
NACM_Drop Ceiling	InteriorFloor	Acoustic Tile - 3/4 in.	Interior Ceiling Notes	☐	☐
NACM_Interior Floor	InteriorFloor	Metal Deck - 1/16 in. Concrete - 140 lb/ft3 - 4 in. Carpet - 3/4 in.	Interior Floor Notes	☐	☐
Base_CZ12-Roof-2	Roof	Metal Standing Seam - 1/16 in. Compliance Insulation R24.86	Roof Notes 2 Product >=25	☐	☐

B. OVERHANG DETAILS (Adapted from NRCC-ENV-02-E)
This Section Does Not Apply

NRCC-PRF-MCH-DETAILS -SECTION START-

A. MECHANICAL VENTILATION AND REHEAT *(Adapted from 2013-NRCC-MCH-03-E)*
This Section Does Not Apply

B. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY
This Section Does Not Apply

Not useable for compliance

C. EXHAUST FAN SUMMARY

This Section Does Not Apply

D. DHW EQUIPMENT SUMMARY – *(Adapted from NRCC-PLB-01)*

This Section Does Not Apply

E. MULTI-FAMILY CENTRAL DHW SYSTEM DETAILS

This Section Does Not Apply

F. SOLAR HOT WATER HEATING SUMMARY (Adapted from NRCC-STH-01)

This Section Does Not Apply

G. MECHANICAL HVAC ACCEPTANCE TESTS & FORMS *(Adapted from 2013-NRCC-MCH-01-E)* **§ RA4**

This Section Does Not Apply

NRCC-PRF-LTI-DETAILS -SECTION START-

A. INDOOR CONDITIONED LIGHTING CONTROL CREDITS (Adapted from NRCC-LTI-02-E) **§ 140.6**

This Section Does Not Apply

B. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROLS (Adapted from NRCC-LTI-02-E) **§ 130.1**

This Section Does Not Apply

C. TAILORED METHOD LIGHTING POWER ALLOWANCE SUMMARY AND CHECKLIST (Adapted from NRCC-LTI-04-E) **§ 140.6**

This Section Does Not Apply

D. GENERAL LIGHTING POWER (Adapted from NRCC-LTI-04-E) **§ 140.6-D**

This Section Does Not Apply

E. GENERAL LIGHTING FROM SPECIAL FUNCTION AREAS (Adapted from NRCC-LTI-04-E) **§ 140.6(c) 3H**

This Section Does Not Apply

Not useable for compliance

F. ROOM CAVITY RATIO (Adapted from NRCC-LTI-04-E)
This Section Does Not Apply

G. ADDITIONAL "USE IT OR LOSE IT" (Adapted from NRCC-LTI-04-E)
This Section Does Not Apply

H. INDOOR & OUTDOOR LIGHTING ACCEPTANCE TESTS & FORMS (Adapted from NRCC-LTI-01-E and NRCC-LTO-01-E)	**§ 130.4**
This Section Does Not Apply	

Not useable for compliance